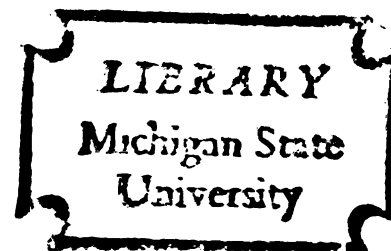


ECONOMICS OF COMMERCIAL EGG PRODUCTION
IN EASTERN NIGERIA

Thesis for the Degree of Ph.D.
MICHIGAN STATE UNIVERSITY
MARTIN H. BILLINGS
1971



This is to certify that the

thesis entitled

The Economics of the Commercial Egg Industry of Eastern Nigeria

presented by

Martin H. Billings

has been accepted towards fulfillment
of the requirements for

Ph. D. degree in Agric. Econ.

Lawrence W. Witt
Major professor

Date February 26, 1971

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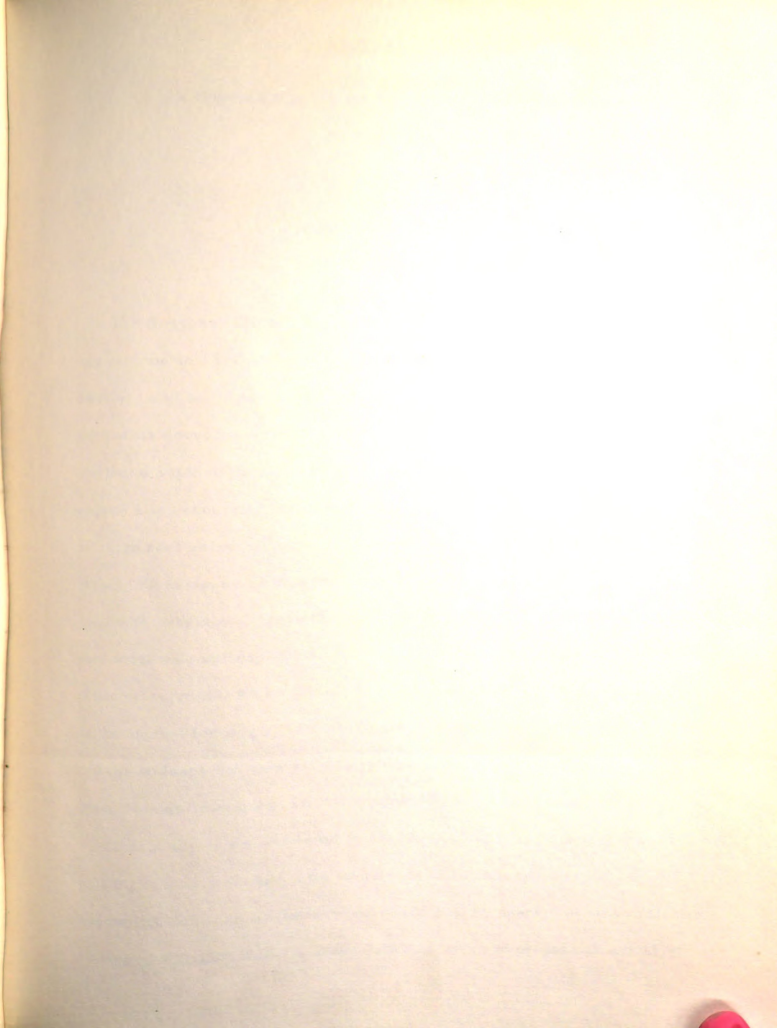
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ABSTRACT

ECONOMICS OF COMMERCIAL EGG PRODUCTION IN EASTERN NIGERIA

By

Martin H. Billings

The Regional Government of Eastern Nigeria initiated a commercial egg scheme in 1960-61 to provide a cheap animal-protein food for urban dwellers and to introduce a modern industry into the rural sector as a part of its development strategy. The project represents an attempt to implant a sophisticated biological technology from the United States into a quite alien economy and environment. The results have been mixed, although real accomplishments have been scored. By mid-1967 a sizable, largely Nigerian-owned and operated industry had grown up. However, even with subsidized inputs, commercial eggs failed to become the cheap food originally anticipated, and many private poultrymen have either failed or seem likely to fail. In part this failure derives from limitations in the market for eggs, in shortages of supplies of quality chicks and feed, and the widespread use of dual-purpose birds, but mainly they seem to stem from deficiencies in management by the poultrymen.

This study is an attempt to examine, identify and quantify the problems existing on commercial egg operations of various types in the region. To accomplish this, an enumeration of 100 poultry operations was conducted to develop a foundation of information on which to prepare an extensive

farm management inquiry. Some 21 farms with 33 flocks were subsequently studied over a period of six months. Daily farm records were kept of each flock which represented the two most typical lines in the region; RIR and Thornber 404 hybrid.

Finally, a survey was conducted in four cities into egg eating habits.

The study showed that farms of all sizes, if properly located, can produce positive net margins given prices for inputs and product prevailing in the region. However, management seems typically quite poor on units less than the largest studied size group. Most of the best-one-third producers are large (more than 600 layers); use hybrid stock and follow superior flock management practices. However, farms of all scales were found to be over invested in housing, over-staffed, and poorly sited. Under present conditions a decline in egg prices below 3/9 (.52¢) per dozen would threaten the economic lives of most of the regions of poultry operations.

The consumer survey showed that although eggs were a widely accepted "superior" food, less than twenty percent of the urban respondents were consuming one egg a week, the region's minimum consumption objective.

The analysis suggests a policy of phased withdrawal on the part of the MOA from the commercial egg scheme, but one designed in such a way to protect insofar as possible the public investment in the industry (estimated to be in excess of £5,000,000) and public confidence in future agricultural development schemes. The following steps are recommended. First, hybrid stock be made available on a large scale. Second, the extension service in cooperation with the land-grant university develop

and make available suitable farm management materials, assist in the training of poultrymen in their use and interpretation. Third, end the subsidized feed supplies at some date sufficiently in the future (say two years) that serious poultrymen have a chance to digest the first three changes. Thereafter the MOA should let the chips fall where they may as regards individual producer survivability.

This scheme would give reason to expect about a third of the present producers to survive, these being the larger typically, the better managed and the best located. As the economies of commercial egg production argue for increased scale it would be reasonable to expect a slowly growing egg supply (in excess of that presently produced by 350 operations) and falling egg prices. With good management a very large number of the remaining producers should be able to approach a 3/- (.42¢) per dozen price. This will not satisfy the regional objective but will provide a solid foundation from which to expand as urban incomes rise.

Submitted to
Michigan State Journal

in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Agricultural Economics

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A THESIS

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1. The first part of the document is a letter from the President of the United States to the Congress.

2. The second part is a report from the Secretary of the Treasury.

3. The third part is a report from the Secretary of the Interior.

4. The fourth part is a report from the Secretary of the Navy.

5.

6. The fifth part is a report from the Secretary of the Army.

7. The sixth part is a report from the Secretary of the Department of the Interior.

8.

9. The seventh part is a report from the Secretary of the Department of the Navy.

10. The eighth part is a report from the Secretary of the Department of the Army.

ACKNOWLEDGEMENTS

This thesis was prepared as an economic analysis of the commercial egg scheme of Eastern Nigeria. It has, however, become by force of events, a historical piece as well. Eastern Nigeria is extinct as a political unit both by its own choice, through secession, and by act of the federal government dividing the region into three parts. The government and the principals involved in the scheme are unlikely to survive the event. It is very unlikely that a poultry industry now exists. It is hard to conceive that many producing units, or the supporting infrastructure are still intact. Bitter combat has occurred in the very locales where the poultry scheme was most dynamic and the outlook consequently most hopeful. Nonetheless the experience of the industry and the reasons outlined for studying it remain valid.

The thesis was made possible by support provided by the Economic Development Institute of the University of Nigeria, Enugu. Many persons in Eastern Nigeria made the collection of data possible, often at considerable inconvenience to themselves and in the later stages at some risk. To all of them I offer my thanks.

Both with regard to my choice of academic specialization and to the not inconsiderable amount of effort that was expended in

among the members of the

to prepare the 1964,

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Dr. Dr. Sylvester

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reviewing the manuscript I would like to thank Dr. Marion Forrester who gave me the idea, Dr. Carl Eicher who got me started and Dr. Lawrence Witt who saw me through. In addition, Dr. Charles Sheppard, Dr. Sylvester Ugoh, Dr. Samuel Attah, Mr. Frank Moore, Mr. G.I. Jones, Mr. Russell Gillham, Mr. Leslie Elmslie, Dr. Anita McMillan, Mr. Uno Udosen, Dr. Frank Siccardi, Mr. Herbert Kriesel, Mr. D.N. Ajaegbu, Mr. P.C. Odeluga, Mr. A.A. Amantu, Mr. M. Okagbue, Mr. Arjan Sadhwani and Dr. Arjan Singh provided invaluable assistance. Special comment must be singled out for Mr. Y.R. Chhabra who single-handedly typed the final manuscript. I have also learned to appreciate the final traditional gesture to one's wife who provided irreplaceable typographical and moral assistance.

"When passing balls tell the boys to pass the ball."

--Only the mysterious angles of the game.

--Only the stuttering voices of the boys.

Can patter out their best prayers.

Robert for Robert's team

Whitened down

1972

The first thing I noticed when I stepped
 out of the plane was the fresh air. It felt like
 a new beginning. The sun was shining brightly,
 and the birds were singing. I took a deep
 breath and felt a sense of peace. The world
 was so beautiful, and I was so lucky to be
 here. I walked along the beach, feeling the
 sand under my feet. The water was so clear,
 and the fish were so colorful. I was in
 heaven. I had found my home.

The music is
 Africa, Nigeria, &
 Mrs.
 S.
 Over
 F.
 A.S.
 Dan.
 Ch.
 B.
 and
 W.

What passing b
 --Only the m
 --Only the st
 Can patter

This thesis is dedicated to my students at the University
of Nigeria, Nsukka, and:

Mbalonye Okagbue

Sunday Nwachukwu

Cyprian Muojindu

Felix Nweke

A.S. Oruche

Danial Ikwegbu

Christopher Mbacci

Benedict Onah

and Oddjob

Who did much of the work.

"What passing bells toll for those who die as cattle?

--Only the monstrous anger of the guns,

--Only the stuttering rifles rapid rattle,

Can patter out their hasty prayers".

Anthem for Doomed Youth
Wilfred Owen
1915

All values are in £

Nigerian currency

£1000 by a £100

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£1000 by a £100

NOTE

All values appearing in this thesis are expressed in Nigerian currency (Pounds, Shillings and Pence) followed by a conversion in dollars and cents.

12 pence (d) = one shilling (1/-)

20 shillings = one pound (£)

The conversion rate as of April 4, 1967, the date of my departure from Nigeria was as follows:
(Nigeria is a member of the sterling area).

1 shilling = .14¢

1 pound = \$2.80

TAL

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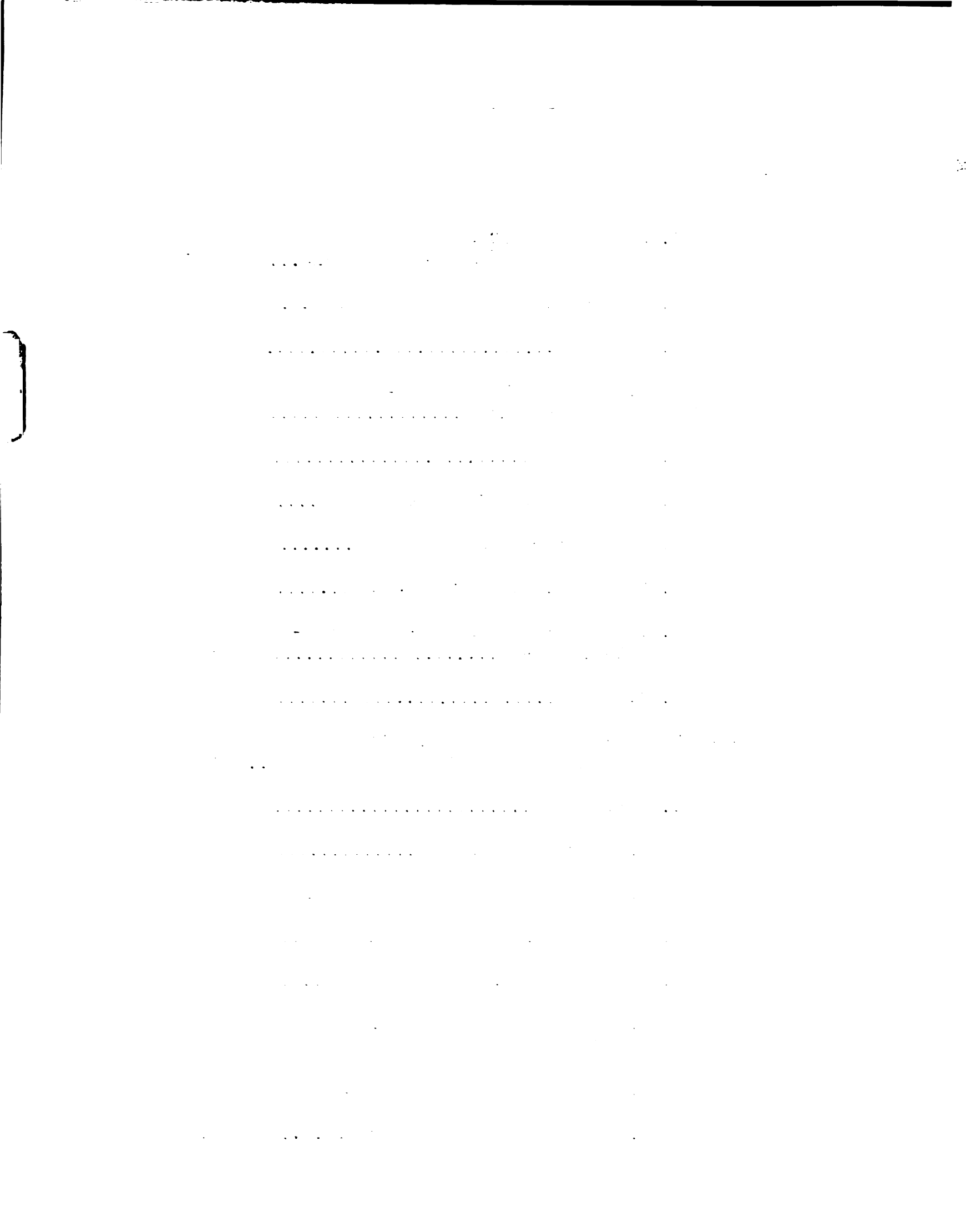
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1. Objective of this Study

This thesis will examine the role of the commercial egg industry of Nigeria. Consumption will be examined. The effect of the industry will be considered in some detail. The role of the public sector will be examined. The productivity of egg producers will be examined. Recommendations for the industry will be suggested and the problems for future research.

1. Reinier, Gerrit. The Eggs of the Netherlands. (Amsterdam, 1955), xviii.

2. Since the departure of the British from Nigeria, the Federal Republic of Nigeria has passed an Ordinance to Detest the British. The British have consequently broken out. Since this study was published and the British colonial government, and as the poultry industry is now active in the country, the use of the former name of the industry will be indicated throughout, and the analysis will proceed in the same manner.

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CHAPTER 1

INTRODUCTION

"The experiences of colonial development are still pertinent and the lessons to be learnt from them should not be ignored. A British writer has observed that, "If the groundnut scheme had been conceived and executed by natives, everyone would point to it as incontrovertible evidence that they were unfit to manage their own affairs" African administrators should beware the double edged nature of this thrust and should try to avoid the mistakes made in previous attempts at economic and social development". 1/

1. Objective of this Thesis

This thesis will survey, describe and analyze the economic aspects
2/
of the commercial egg industry of Eastern Nigeria. Both supply and consumption will be examined. The structure of the industry will be considered in some detail. The costs of production will be analyzed. The role of the public sector will be reviewed. Some tests of the profitability of egg producers will be made. Improvements in the industry will be suggested and the methods for their implementation

1/ Reining, Conrad, The Zande Scheme (Northwestern University Press, 1965), xviii.

2/ Since the departure of the writer from Nigeria, the Eastern Region has passed an Ordinance of Secession from the Federation and established itself as the Republic of Biafra. Civil war has subsequently broken out. Since this study was performed under the former political arrangement, and as the poultry industry existed entirely in that context, the use of the former name of the territory will be followed throughout, and the analysis will proceed in the former context.

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In the past, public policy has been hindered by the lack of current economic data, causing actions to be made under conditions of doubtful knowledge. In this regard, this thesis will hopefully be of service to policy-makers in guiding the poultry industry to attain the useful goals for the region it was established to serve.

2. Background and Justification for the Study

The Government of Eastern Nigeria, beginning in 1961, planned, initiated, financed and supported the development of a commercial egg industry as one means to provide a cheap amino-acid protein-rich food at prices acceptable to the general urban public. The project represents an attempt to transfer from its native economic environment a sophisticated highly productive technology and implant it into a quite alien economy. The results have been mixed although some firm accomplishments have been scored. A sizeable industry has been developed that is largely Nigerian owned and managed. The new technology has been mastered to a considerable degree and respectable levels of production attained. However, the great effort that has been

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made notwithstanding the industry is at a critical juncture. The industry has failed to achieve its initial purpose; commercial eggs are not yet available as a cheap protein food. Numerous producing firms have failed, and others appear in danger, although quite generous subsidy arrangements have been maintained.

The success or failure of the commercial egg industry will have bearing on the future response of the private entrepreneur to succeeding Government initiated schemes. This will in turn have an influence on the strategy and design of future development projects undertaken by the public sector.

The decision is not at all uncommon to push ahead at an early stage of development with schemes ^{3/}designed primarily to uplift the present well-being of the public. Not a few programs elsewhere include investments which seek to improve the quality of life within a specific planning period. Although political need is one factor explaining such schemes, in the case of Eastern Nigeria the desire for a better diet was identified by policy-makers as both a welfare measure and as a pre-condition from which a higher productivity from labor might follow. A poultry industry was selected to meet these goals.

^{3/} The term 'scheme' is used here as the popular Nigerian usage as equivalent to "program" rather than in the sinister or corrupt sense of a plot towards evil ends.

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The decision to use poultry as a vehicle to obtain an essentially social end reflects the widespread belief that a modern commercial egg industry is easy to introduce. This study will shed some light ^{4/} on this widely held notion.

Similarly much support exists for the comparative virtues of dual-purpose Rhode Island Red (RIR) stock. United States Agency for International Development (USAID) and Peace Corps Missions the world over have introduced this bird into projects which purport to be "commercial egg schemes". The comparative costs of dual-purpose and single-purpose stock will be examined.

The initiation by public policy of a modern commercial egg industry into an economy such as the Nigerian, represents an attempt to transplant a highly efficient technology from a developed wealthy economy to a much less developed poor one. Commercial egg production in the United States is a wondrously efficient, highly productive industry. American poultrymen, with good management, cheap feed and high quality birds, can produce large quantities of low per-unit cost eggs from which they realize a small per-unit profit. This vast production is sold to the

^{4/} In its meeting at Lagos in September 1965, the FAO African Poultry Conference repeatedly stressed the virtues of such an industry in the African context, especially, with regard to small-scale operations.

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world's richest large society. Some of the problems to be dealt with in this study may be associated with moving a technology to Nigeria where quite contrary economic conditions prevail.

The poultry industry is the first to have been started with purely the domestic market in mind. Other publically-supported schemes have been initiated as exchange earners for an overseas market. In the case of the poultry venture the Nigerian consumer is the intended direct benefactor. This thesis will examine the benefits he has received.

Government has played a major role in introducing and fostering the industry. It provides subsidized feed and chicks. It operates an egg marketing scheme and pays guaranteed prices for all the eggs sold to the scheme. Government provides free vaccines and veterinary services. But little information exists as to the effect of public policy on profitability, or egg consumption. Neither does a clear impression exist as to the likely effects of changing all or some of these supports, or withdrawing them on the industry. These important questions will be analyzed in this study.

The manner of the inception and development of an industry in a country such as Nigeria is of interest. Three paths seem to exist. An industry may be the product of foreign initiative that is later

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imitated by local entrepreneurs. Or, an industry may begin and remain solely a public venture. The third path is that of a joint effort by public and private groups: the public sector undertaking the more lumpy investments leaving those operations with a lower entry cost to private investors.

Before 1960-61 commercially produced eggs were largely consumed by the expatriate community, for whom eggs were imported and sold at high prices. This market did not, however, excite sufficient local production to replace the imported good. The demonstration effect failing to bring substantial response, Government took steps to produce eggs domestically while at the same time hoping to reach a much wider market. The Government sought to encourage mass egg consumption by simply making available quantities of "cheap" eggs. In Hirschman's terms it sought to use forward linkage, or the supply approach, wherein a cheaper product will stimulate its own demand. This study will
^{5/}
examine the success of the method.

5/ It should be noted that Government has successfully used forward linkage to encourage poultrymen to enter the business. But back linkage efforts have failed so far to stimulate adequate production of maize for poultry ration. Some of the interesting reasons for these will be covered in Chapter 2.

P. Kelly, *African Foodways: The Nigerian Bread Industry* (Lagos: University, 1965, Nigerian Institute Studies, Chapter 2, P. Kelly, "Organization and Production in Nigerian Foodways", *Quarterly Journal of Economics*, 12, 1964.

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The quality of management is part of, and relevant to, the whole ^{6/} question of the development of a Nigerian entrepreneurial class.

Entrepreneurship and management loom as a critical bottleneck in many development schemes in Nigeria, Africa and elsewhere. Little empirical research has been done, but the experience of the poultry industry as reported in this study may be useful in pin-pointing the sources of entrepreneurs; their problems and practices.

3. Specific Objectives of the Thesis

The emphasis of the thesis will be unequally divided between description and analysis. The abnormally great stress placed on the history, organization, planning participants and the political environment of the industry is attributable to the fact that it had not been done before, and is needed. The commercial egg industry is new and much of the data regarding its background have not been brought together before.

The first five chapters will be essentially descriptive but will lay the foundation for the analysis in the final four chapters.

The thesis will attempt to satisfy the following objectives:

- a) identify, through description and analysis, the structural bottlenecks which affect the industry.

6/ P. Kilby, African Enterprise: The Nigerian Bread Industry (Stanford University, 1965, Hoover Institution Studies), Chapter 8; P. Kilby, "Organization and Productivity in Backward Economies", Quarterly Journal of Economics, May 1962.

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- b) quantify and explain the cost structure in commercial egg production for various types of commercial producers.
- c) estimate the profitability of representative commercial egg farms given the variables of scale of operation, breed, feed, location and quality of management.
- d) in the light of the above findings, discuss public policy regarding the industry and consider alternative policies open to Government.

4. Summary of Previous Research

Very little material is available dealing with poultry rearing in the tropics, or on any aspect of poultry in Nigeria.

The Director of the World Poultry Science Library, Cornell University, Dr. J.H. Bruckner was unable to provide any references from the library on the subject. The library of the Food and Agriculture Organization (FAO) in Rome was personally searched with similar results. Likewise a review of all Ph.D. dissertations written on the subject of poultry since 1891 failed to reveal any relevant work. However, several recent studies have been located, which underscore the paucity of research on the subject.

Several papers were produced for the FAO-sponsored conference held at Lagos, on Poultry Problems in Sub-Saharan Africa in 1965.

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One deals directly with Nigeria, while four others have some relevance. Three of the latter were written by an Israeli Specialist, A. Ben-David: (1) The Marketing of Eggs and Poultry in Africa; (2) Ways and Means of Stimulating the Consumption of Poultry in Africa; and (3) Upgrading of Local Poultry Breeds in Africa. The fourth paper, Eggs and Poultry Marketing in Africa, was by J. C. Abbott, Chief Marketing Branch, FAO. As the titles suggest, these papers address themselves to very broad issues - but which are nonetheless relevant to Eastern Nigeria and provide some background material.

The paper most pertinent to this thesis is the official statement on the subject by the Government of Eastern Nigeria: The Status of Poultry Production in Eastern Nigeria^{7/} prepared and read by D. N. Ajaegbu, Principal Agricultural Officer - Livestock, Ministry of Agriculture (MOA). The seven page report summarizes the history of the industry and briefly sketches the physical state of the industry in mid-1965, including the number of producers, the rate of production of day-old chicks at Abakaliki (the regional poultry center) and the development of feed mash by the MOA.

^{7/} These were papers read and distributed at the FAO-sponsored conference on Poultry Problems in Sub-Saharan Africa, 6-11 September 1965, in Lagos. The papers may have been subsequently compiled as a Proceedings, but I have been unable to find them.

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The reports of several USAID specialists provide surveys of problem areas and progress reports on USAID-supported poultry schemes in various regions of Nigeria. In two terminal reports prepared by C.L. Davis at the end of each of his two two-year terms in the region (1960-64) summarize the accomplishments of the period, identify things left to do, outline the problems and suggest policies needed to overcome these problems.^{8/}

A more valuable report, from an economic standpoint, is that of K. Brundage; Economic Analysis of Poultry Activities in Eastern Nigeria.^{9/} Brundage, a Farm Management Advisor with USAID/Ibadan, spent a week in Eastern Nigeria in April 1964 surveying producers, hatcheries and the Government feed mill. The paper presents conclusions drawn from the visit. Although are labeled 'preliminary', no final conclusions have been forthcoming. From his survey Brundage produced a rough estimate of per-unit costs of chicks and feeds produced on Government-operated sites. Brundage proposed raising the price of feeds to allow the Government to satisfy its policy of making all Government-operated directly productive activities self-liquidating in terms of their recurrent costs.

^{8/} Davis, C.L., Terminal Reports, (First and Second) are from the unpublished files, USAID Mission, Lagos, Nigeria.

^{9/} Brundage, K., reports are from unpublished files, USAID Mission, Lagos.

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A short unpublished paper was prepared by W. McClusky of the Michigan State University staff, serving at the University of Nigeria, Nsukka. ^{10/}The Economics of Poultry Production, is a discussion on what the composition of costs ought to be for a dozen eggs, and was read at the Annual Poultry Conference at Nsukka, June 1965.

A workshop held at Nsukka in April 1966 dealt with the poultry industry throughout the Federation and produced a Proceedings which was mimeographed by the Economic Development Institute, Enugu. It contains reports by nine working groups which examined nine problem areas identified by the workshop. Extensive use of these working papers is made in this study.

Relevant to the Eastern Nigeria situation are two journal articles produced in Western Nigeria. One of these is "Costs and Returns of Private Commercial Egg Production in the Ibadan Area: A Pilot Investigation", by John Abaelu. ^{11/}A crucial fact brought out by Abaelu, and relevant to Eastern Nigeria, is that the battery cage technology is a very expensive system for Nigerian producers to adopt. The high initial cost of the cages raises the break-even point above what can be typically realized by most poultrymen in the Western Region. "Some

^{10/} McClusky, W., unpublished paper from USAID files, Enugu, Nigeria. Five pages.

^{11/} Abaelu, J. N., "Costs and Returns to Private Commercial Egg Producers in the Ibadan Area: A Pilot Investigation", Bulletin of Rural Economics and Sociology, 1964, Vol. 1, No. 1, page 75-86.

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Observations on the Pattern of Egg Production in Southern Nigeria", by A.N.A. Modebe, of the University of Ibadan, deals with the problems of introducing exotic stock into Nigeria and comparing their performance to local birds.^{12/} Modebe finds no insuperable barriers to the introduction of foreign strains, but comes out with a strong recommendation in favor of a reconsideration of the local stock as a potential commercial layer. He also compares the effects of the dry and wet season on hatchability, rates of maturity and mortality and rates of production. The favorable performance of indigenous birds compared with the foreign strains led Modebe to this conclusion. Other research and experience suggest that exotic birds exist which are better than the Barred Rocks and New Hampshires studied by Modebe whose preference for indigenous birds is based on a less than complete sample of available types.

Poultry Management in a Sub-Tropical Semi-Arid Climate, by Burt W. Heywang,^{13/} is the only USDA document located that had some relevance to Nigeria. The bulletin was written with the experience of the American South-West in mind and was directed to producers in that area. The work focuses its attention on problems of adaptation

^{12/} Modebe, A.N., Obioba, F. and Limar, M., "Some Observations on the Pattern of Egg Production in Southern Nigeria", The Nigerian Grower and Producer, 1963, Vol. 2, No.2, page 20-31.

^{13/} Heywang, B.W.: Poultry Management in a Sub-Tropical Semi-Arid Climate, USDA, Production Research Report No. 5, 1962, Washington, D.C.

of husbandry techniques developed in the north-east and north-central United States to the south-west. The point is made, relevant to the Nigerian case (and substantiated by Modebe's paper), that the layer technology developed in temperate climates is easily transferable to a sub-tropical one if provision is made for extra water and cool housing. With regard to the latter point, good ventilation for flocks is stressed. Heywang also points out that in the south-west white leghorns have been the most efficient producers although they mature more slowly under conditions of greater average temperature. Heywang and Modebe concur that no insuperable barriers exist to the importation of exotic stock and technology into Nigeria.

No study, similar in intent to this, appears to have been done. Hopefully, the material which follows will go some way toward filling this gap.

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CHAPTER 2

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"It is certainly possible to develop modern poultry - rearing on a large scale in Tropical Africa, by selective breeding and by using the latest concentrated feeds, first of all imported, and later manufactured locally. Such poultry farms already exist, but their cost of production is excessive, as in Dahomey... (but this constitutes a certain degree of progress". 1/

1. Introduction

This chapter will present in very broad strokes the background, justification and strategy of growth adopted by the Government of Eastern Nigeria, and the inception and development of the regions' commercial egg industry. An attempt will be made to account for some of the characteristics of the industry. The factors which led to the decision to embark upon the scheme will be reviewed. The welfare and political judgements which have affected its timing, scale and objectives are examined. A brief survey will be made of the major problems experienced during the growth process. Finally, the present (spring 1967)

1/ Dumont, Rene, Le Développement Agricole en Afrique, ECA, Nairobi, February 1965, page 118, translated.

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2. The Beginnings - Historical Background (1919-1960)

A. Introduction and Selection of Stock

In Nigeria, as in many other countries past and present, families maintain flocks of free-ranging poultry about their homesteads to provide an immediate supply of fresh and cheap meat and eggs. Both urban and rural compounds are the site of such rudimentary poultry keeping in present-day Nigeria. Methods of husbandry are simple. The flocks, varying in size from a few birds to several dozen, are allowed to range freely in and about compounds, fields and city streets, scavenging. The poultry are expected to feed themselves, although wastes may be made available before slaughter time. Housing is rarely provided, and if present at all, is little more than a lean-to shelter attached to the house.

The stocks are "mongrel" birds; high in rearing mortality, low in egg production, slow to grow, and of modest size at maturity. Their meat texture can only be described as "very" tough benefitting the rugged lives they so briefly survive. The degenerate condition of the "bush"

2/ The material for this section of Chapter 2 was largely gathered from oral sources: A. N. A. Modebe, G. G. Amantu, D. N. Ajaegbu, O. B. Mba, and from correspondence with C. L. Davis. Written sources, largely fragmentary, are: MOA files LV-130 (speeches) and LV-23 (history).

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chicken, its most common sobriquet, has no doubt been accelerated by the custom of selecting for slaughter the largest bird obtainable of the flock leaving their swifter but smaller and more fibrous fellows to beget progeny. The cumulative climax of this adverse selection yields a singularly unpromising, though hardy, producer of poultry products.

The folklore of the colonial era held that the extreme perversity of tropical conditions precluded the establishment of any type of intensive husbandry. So inhospitable were Nigeria environmental conditions believed to be (by colonial observers) that commercial production of eggs was ruled out as a serious theater for public investment. Consequently, stress in poultry research continued throughout the inter-war period to concentrate on the problem of upgrading backyard poultry to the exclusion of the development of an intensive technology.

As far back as 1919, a two step program to upgrade these indigenous flocks was adopted. First, experiments were undertaken to study the survivability, productivity, and prolificity of differing exotic breeds under Nigerian conditions. Second, selected stock was made available to be bred onto the existing bush fowl. The succeeding poultry experiments were accomplished at Moor Plantation, Ibadan. To follow-up and expand on these beginnings and to gain greater experience with varying husbandry techniques, a large pilot scheme for poultry research was begun at Agege in the 1930's. Here, further work on the adaptability of different breeds was done.

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Many varieties of fowl were studied at Moor and Agege and at length, ^{3/} the Rhode Island Red (RIR) emerged as the best compromise. The RIR appeared resistant to the rigors of scavenging life yet possessed good characteristics as dual-purpose birds, with a satisfactory blend of both meat and egg producing traits, as well as qualities of hardiness, resistance, and size. It also seemed tolerant of the mediocre handling expected of local poultrymen. Moreover, the RIR was physically appealing to Nigerians of the forest belt, a factor which no doubt aided its rapid acceptance into the local scene. The RIR cock was distributed widely and considerable upgrading did in fact occur. Today, even the casual passerby is struck by the omniscience of RIR-type birds in villages and towns throughout Nigeria. ^{4/}

Gradually, the scope and ambition of the program increased as more was learned about the response of RIR and other strains and breeds

^{3/} Among the breeds studied were Light Sussex (LS), Brown Leghorn (BL) White Leghorn (WL), and the Australorp (which turned out to be highly susceptible to disease and sensitive to the climate). The BL was found to be too similar in appearance to the traditional bird to be acceptable. The Australorp, aside from its poor livability prospects, also manifested feeble meat and egg production characteristics. White Leghorns produced white eggs which was not believed to appeal to local consumers. Its higher rate of production, moreover, was offset by its sensitivity to the environment.

^{4/} The Ministry of Agriculture (MOA) in Eastern Nigeria imported sexed day-old RIR stock from the United Kingdom. Between 1955-61, some 10,950 chicks were imported, reared on government farms (Abak, Abakaliki, Nkwelle, Owerri and Umudike), and then sold as growers and pullets. LV-130, speech by Nwoye Otue, Ministry of Agriculture.

to the tropical environment. Tentative experiments in intensive husbandry proved successful; and confidence in poultry possibilities mounted accordingly.

B. Selection of Husbandry Technique

From such small beginnings, the poultry program grew with each little success. New stations were established. A very large one was begun at Fashola (1946), near Oyo, in Western Nigeria, which became the central experiment station and training center for agricultural projects, including poultry. At about the same time the first such center was established in Eastern Nigeria, at Umudike, near Umuahia.

However, the mere upgrading of existing scavenging flocks is not a first step to the establishment of a commercial egg industry, which^{5/} virtually demands the development (or introduction) of an intensive poultry technology. This condition was satisfied in 1957 with the first successful demonstration of the deep-litter system, introduced by a Canadian poultryman, E. W. Findlay. Findlay began by building small poultry houses 12' x 16', and placing 50 RIR layers in each. Hitherto, the only flock management technique used had been open-range; which caused laying and hatching to be confined to the dry-season (October-March). This technical breakthrough established an important pre-condition for a commercial egg scheme in Eastern Nigeria.

^{5/} It is fair to note that the very success in producing numbers of birds to be distributed under the upgrading program undoubtedly contributed to the belief that large-scale husbandry was in fact possible.

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Two persons may be given the credit for the long jump that followed - transforming the small-scale experiments of Findlay into the ambitious program of the 1960's: J. C. Eme, a career civil servant in the Ministry of Agriculture and M. I. Okpara, at that time Minister of Production, but later the regional Premier of Eastern Nigeria. Eme had been a participant in Findlay's experiments. Upon being placed in chage of the government agricultural station at Abakaliki, he began to intensify and enlarge upon these activities. By 1959, the poultry program had begun ^{6/} to take on some of the trappings of an industry.

The arrival on the scene of improved RIR chicks whetted the appetite for more; amounting to a demand considerably in excess of available supply. To meet this market, a few tiny hatcheries sprang into being. The substantial foreign community, and a small but growing urbanized Nigerian population, were already consuming all the eggs coming into

^{6/} From this point, the story diverges into two distinct channels: that course followed by the Eastern Region, and the one followed by the West. The course followed in the West anticipated the Eastern experience and undoubtedly provided an antecedent to encourage the East. In the West, the presence of the Israeli specialist, Goran, led to the adoption of battery cages as the husbandry technology. The two most important Western Research Stations, Fashola and Moor, contributed to Eastern growth by training many of the senior persons now in the MOA, Eastern Nigeria.

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local markets and then buying additional quantities of eggs imported from the Netherlands, and elsewhere. To Eme, now operating the substantial and successful deep-litter houses which he had constructed at Abakaliki, the poultry program had clearly reached a point warranting its development into a full-fledged industry: one that augured to become self-supporting in a relatively brief time. The technology was proven. The RIR bird had nearly thirty years of Nigerian experience behind it. A market existed, albeit a small one, but one that would surely expand if egg prices could be reduced. In addition to these factors was a widely held view that the introduction of poultry husbandry would be quite simple.

Socially, few impediments resist the introduction of intensive poultry husbandry in Eastern Nigeria. Further, no pre-conceptions derive from traditional practices with regard to management, save for the propensity to let housed flocks out of their houses for "fresh air and exercise" (an explanation given several times). One can generalize that the new technology could be given to and accepted by Easterners with few reservations, although often with little understanding. The deep-litter system required only one "trained" manager. Poultry with its houses and impressive flocks provides a quick demonstration effect and gives a not entirely justified aura of quick returns to investment

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as egg production mounts. Finally, poultry housing, such as required for the deep-litter system, required little land - an important consideration in land-scarce Eastern Nigeria.

For these reasons the industry appeared a "natural" to receive substantial public support. This support was enlisted by a report written by Eme and D.N. Ajaegbu (in 1967 the Principal Agricultural Officer - Livestock, MOA), to Okpara. The report met a receptive audience.

3. The Apparent Need for the Industry

8/
A. The Political Setting

Michael I. Okpara was one of the first leaders in Eastern Nigeria to appreciate the role that the food and primary producing sector could, and must, take if the region was to begin its progress along the path

7/ The converse is, of course, equally true. Poor management leads to a dramatic response as mortality increases and/or egg production declines sharply. Management is in effect, paced by the sensitive nature of the birds, forcing some level of skill if there is to be any success at all. It was felt that such minimum husbandry techniques could be taught to and absorbed by the semi-illiterate personnel who would manage the poultry farms.

8/ I am indebted to T. V. Erikosema, a political scientist with the Economic Development Institute, Enugu, for the background data for this section. Erikosema had a document on Fabian Socialism published by the Eastern Nigeria Government (1962) from which he drew some of his information. A further source is LV-130 - Speeches - in which Okpara's position is alluded to by various government spokesmen. Also, conversations with Zik's son, formerly at MSU, added substance to it.

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of economic growth. His administration also fostered a marked strengthening of the farm extension service and pushed the development of the veterinary service. Although the economic wisdom of some of his program as growth agents have been questioned, Okpara's policy broke with the previous emphasis on a rapid development of an industrial infrastructure.

The long time proponent of industrial and infrastructural development has been the other great figure on the eastern political scene - Nnamdi "Zik" Azikwe. The 1958-62 regional budget reflected this bias when £874,000 (\$2,447,000) (or only four percent of total expenditures) were allocated to the agricultural sector, and of this small sum the bulk was allotted to the stimulation of exchange-earning primary production.^{9/} During this period, the funds of the marketing boards were increasingly diverted to finance non-agricultural industrialization schemes.

In taking this stand Zik reflected his antecedents as a student during the Fabian-influenced "20s". His outlook, and thus the tone of his regime was distinctly and resolutely directed toward the development of the infrastructure for an urban industrial economic base to the general exclusion of agriculture. It was a kinder, less feverish, era when Zik's generation grew to maturity; a period when those problems now pressing

9/ Eastern Nigeria Development Plan, 1962-63 (Enugu: Government Printer, 1962), page 8-9.

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on the region's economy were less evident. In the 1930's and 1940's food shortages were no longer chronic, partially as a result of the long British peace. The flow of people from over-crowded rural areas to the new cities was only a trickle before the flood that was to fill them with young semi-literate unemployables by the late 1950's - and there were fewer people too.

Always populous, Eastern Nigeria has become one of the most densely populated areas of Tropical Africa, a dubious distinction whose economic implications have only recently made their presence felt. Until the gap between urban and rural living standards became more marked, stimulating the onslaught of intersectoral migration, this substantial population did not make itself felt on food supply or on the economy at large.

For these reasons, Zik's generation did not see the rural sector as a constraint to development. They believed that development could progress setting its own conditions and priorities, rather than become the present race between mounting population and lagging food production.

To this race, the younger generation found themselves heir. In speeches made by his ministers, as well as his own, Okpara's government acknowledged that steps had to be taken to step up food production, improve the quality of diet, widen rural employment opportunities and to increase rural earnings, if the pre-conditions for

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future industrial and general development were to be met.

Changing conditions compelled the new generation to grope towards an agricultural solution. In the narrative of the Second Development Plan, Okpara's government gave evidence of this understanding.

"No serious improvement in the pace of overall progress can be made until agricultural productivity has been increased - both for exports and in food crops. The growth of the industry may be retarded if food production is not significantly expanded. The aim is not to make the region self-sufficient but to increase the protein content of the diet and to raise and diversify the production of those crops for which the region has a natural advantage.

As a priority the Eastern Nigeria Government has to tackle fundamental economic and social problems. The 1962-68 plan will emphasize the more directly productive sectors of the economy - agricultural and industrial ... agriculture will get the first priority. ... The development of industries is also expected to spur the demand for food. A well-nourished labor force requires an increased protein percentage in the diet. So poultry, livestock and fish are to be developed". ^{10/}

The development plan of 1962-68 allocated 34 percent of its much greater budget to the rural sector, some £ 36,821,000 (\$104,000,000).

^{11/}
B. Nutritional Needs of the Region

The above narrative makes clear that the thinking of Regional planners transcended purely economic considerations and attempted to

10/ Eastern Nigeria Development Plan, 1962-63 (Enugu: Government Printer, 1962) page 8-9.

11/ Halverson, The Present Nutritional Situation in Nigeria (USOM, Nigeria Consultant's Report No. 4, September 16, 1961), page 25. Jon H. Halverson, ICA student research project. Most of the material in this section comes from Halverson. These figures, which are rough, do not include wild animal protein, which may be of varying importance by area.

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reach out and touch one of the more fundamental afflictions of the society, a serious deficiency in nutrition. This latter consideration appears to have been of itself decisive in giving rise to the poultry scheme.

It is generally accepted that there exist a number of imbalances in the typical Nigerian diet which agriculture and production policies should aim to lessen as rapidly as possible. The nutritional situation in Eastern Nigeria is especially stubborn in that the degree of caloric and protein imbalance is so extreme. The proportion of calories coming from starchy foods such as roots and tubers is nearly 80 percent whereas any more than 75 percent is considered undesirable. Due to the predominance of yam and cassava in the local diet the daily protein intake is only 33 grams compared to 90 grams in developed countries.

Even the protein intake actually realized is deficient in vital amino-acids (such as lysine), obtainable only from animal sources or such presently unavailable (or scarce) vegetable sources as cowpeas, beans, millet and soybeans. Animal protein remains in short supply in the diet for several reasons. Unquestionably, the most important is the presence of tsetse fly which effectively prohibits the establishment of commercial animal husbandry. Goats, swine, and dwarf fly-resistant muturu cattle are present and are consumed, but in insufficient quantities to solve the basic nutritional problem. However, mounting quantities of dried fish now enter the region.

Since proteins cannot be stored for future use by the body, they must be consumed in regular balanced meals. In rural, and even urban areas, the small amount of available meat, including poultry, is conserved until a big feast day, and is then consumed all at once; thus wasting most of it from a nutritional point of view.

Children, especially those recently weaned, suffer most because they get the smallest and least desirable portion of the food. This practice is justified on the ground that children are the least productive family members and individuals are allowed quantities of food proportionate to their original contribution of labor. Nursing children are not much better off as the feeding mother enjoys no priority at the food pot and also has to do much heavy work. She is, therefore, able to provide only inadequate quantities of milk to the young.

A possible source of protein is goat's milk. But this is looked upon as a repugnant food (reports Jones)^{12/} - goats being considered the filthiest of beasts. The other convenient source is from eggs. The household scavenger flocks do lay eggs (about 40 per bird per year), but these are not much eaten as they are looked upon as potential

^{12/} I am indebted to G.I. Jones, Jesus College, Cambridge, for his insights into Ibo egg-eating customs.

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chickens. Indeed, consumption of eggs is felt to be an extravagance for each egg eaten is one less chicken in the compound.

Certain food taboos center on eggs. Children, it is said, are likely to become thieves if they develop a fondness for such an expensive food and, consequently, are discouraged from eating them. This latter notion is widely held throughout the southern forest belt of Nigeria. Urban families can keep few chickens and so are denied even this source of eggs and protein.

The effects of protein deficiency is striking and lasting. Among
^{14/}
them:

1. Excessively high mortality particularly among children, and widespread anemia (one of its most prominent physical effects being the water-logged look among children).
2. Among survivors of childhood are subsequent adverse intellectual effects. Pre-natal and childhood development of muscle and tissues, including brain cells, can be seriously impaired by

^{13/} Poultry is also regarded as a source of occasional income to augment the family budget. Protein foods are often sold for cash to buy carbohydrates. Were the poultry consumed at home, the amount of filling carbohydrates that can be bought would be reduced.

^{14/} Agriculture, Science, Technology Development Serial, "Meeting Human Needs Through Agriculture and Food Practices"; Scrimshaw, Nevis S. (MIT, Vol. III, U.S. Printing Office, 1963) and LV-23 Poultry Policy and General (MOA), page 89.

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inadequate consumption of amino-acid rich protein.

3. Among adults, work capacity and attention spans are curtailed.

The dual factors of nutritional ignorance (itself a function of low levels of popular education) and terribly low incomes (less than \$60 per capita per annum) are basic reasons for the present nutritional deficiencies in Eastern Nigeria, causing even what supplies are available to be either misused or wasted.

Low incomes will persist for some time to come, until general economic improvement permeates all strata of livelihood; however, dietary ignorance and eating habits can be combated more directly.

^{16/}
One way, is through better nutritional education. A second is through the provision, in one way or another, of cheaper protein-rich foods. In apparent recognition of these realities the following policy guideline was laid down in the Second Development Plan:

"If production is to be increased and the standard of living raised, it is essential that the people eat food rich in protein. Nigerian foods lack sufficient animal protein for a balanced diet. Towards correcting an imbalance of this nature, the regional governments of the Republic have established projects

^{15/} This point is very much at the core of much of India's present concern regarding the substantial nutritional shortcomings in popular diet. Mr. Jagjivan Ram, Union Minister of Food and Agriculture once said, in a private interview, that due to these deficiencies India is raising generations of persons of sub-intellectual capacity, representing one of the most serious developmental problems which India must overcome. The problem has been of less magnitude, but not on that account less serious, in West Africa.

^{16/} Even at lower income levels better balanced diets are possible than now prevail. Further work is being done in this regard. See, Constructing the Nutritional Model, and the Livestock-Human Nutritional Balance in Nigeria. Both by V. E. Smith (CSNRD Working Paper 1967).

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for increasing the production of fish, meat, butter and eggs. Related to these is the development of poultry farming". 17/

4. The Poultry Project

A. Decision and Plan

The report prepared by Eme detailing the technical feasibility of large-scale commercial production of protein-rich eggs through an extensive poultry scheme was, therefore, received by a Minister of Production acutely aware of the need both for greater food production and better quality foods. On his travels abroad, Okpara had seen large-scale commercial egg producing sites and had come to understand that the same thing was technically feasible in Eastern Nigeria. Given the known need this must have acted as a powerful incentive on him. Moreover, a similar scheme was already well-advanced in Western Nigeria; which helped dispel any lingering fears as to early success, and may even have kindled a competitive spirit. Consequently, Okpara made the decision to go ahead in the East as well (1959).

Before following the history of the commercial egg project, it will be useful to digress briefly into some aspects of the planning methodology followed in Eastern Nigeria as this has some bearing upon the subsequent course of events. The poultry scheme was

17/ Agricultural Development in Nigeria, FAO, 1965 (Rome),
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Under the 1954 Constitution, responsibility for agricultural development was assigned to the separate regions. In Eastern Nigeria, this portfolio is vested in the Ministry of Agriculture (MOA). Since the beginning of the Okpara regime, this Ministry has become very important and has exerted much of the drive behind present developmental efforts. These efforts are expressed collectively in the regional development plan.

In 1962 the Government of Eastern Nigeria inaugurated its plan for the planning period 1962-68. Although the poultry scheme antedates this plan conceptually by nearly three years (and operationally by one), it has nonetheless been included in the plan under six of its 81 project titles.^{19/}

The importance of the plan to the poultry scheme lies in the planning methods and organization employed by the regional government

^{18/} Several specific sources contributed to this section: Hagen, E.E., Planning Economic Development, P.E. Clark, Planning for a Country in Transition (Nigeria) Irwin, 1963, Moore, F.J., "Development Planning in Eastern Nigeria", Journal of Local Administration Overseas, July 1964, Vol. III, and Waterston, A., Development Planning - Lessons of Experience (Baltimore: John Hopkins Press, 1965). Also MOA: LV-23, LV-130. But mainly this section draws on discussions with individuals close to, or participant in, the planning process. Of special use were the seminars in planning given by Dr. Rikard Lang, Director of Institute for Planning, University of Zagreb at the EDI in Jan-Feb. 1967, and attended by members of the Regional Planning Commission, in which their problems and practices were aired and discussed.

^{19/} A list of the relevant titles and an estimate of the total cost to the regional government of the scheme is located in the appendix.

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Once the decision was made by the Regional Prime Minister to push forward with a commercial egg scheme, the project was turned over to the technicians of the responsible section in the MOA to be planned and implemented. The people who planned the poultry project, and who have managed it since, are specialists in several technical areas of livestock and poultry husbandry. Their experience had been at government research stations where they had experimented with

20/ It should be made clear from the outset that in Eastern Nigeria the Planning Ministry does not formulate specific policy for the tactical or implementational levels. Indeed the specific jurisdiction of the Planning Ministry is open to question. Moore describes its functions: "The function of the Ministry of Economic Planning was to be largely one of directing, guiding and coordinating the planning activities of the other ministries. This was necessary not only because of a shortage of staff.... and their lack of specific expertise within a variety of technical fields; delegation of responsibility for planning was considered essential in order to give the executive ministries a real feeling of participation in planning for development" (Moore, op. cit.). A rather simple procedure was used to determine which of many proposed schemes could be initiated (my source of this procedure are members of the Planning Commission who expressed the method orally during the Lang Seminar). Individual ministries are called upon to submit schemes and proposals, along with their cost estimates. These were subjected to the following criteria by the Ministry of Finance to determine whether or not they would be acceptable. The schemes were arranged under four priorities. First priority was given to Eastern Nigeria Development Corporation (ENDC) schemes. Second priority was given to those to which definite foreign aid was committed. Third priority was given to those to which some chance of foreign aid existed and which seems to be appealing or urgent. Category four comprised of schemes with virtually no chance of foreign financing. The poultry scheme would seem to fall into the third category since only part of it was financed from abroad, but it was the beneficiary of the determining criterion in that the commercial egg scheme enjoyed support from the highest political quarters.

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deep-litter houses, feeds and poultry breeds. When called upon to transform their experiments into a commercial industry, it was only natural that the method adopted was to do what had been done experimentally; but on a vastly larger scale. However, the fund of experience possessed by these managers (and by the USAID advisor later associated with the project) restricted the areas of government initiative to those segments where the planners felt most technically competent. This constraint has made itself apparent from the first.

There is no single method of introducing an industry where none has previously existed and the method must be subordinate to the relevant circumstances. The means adopted by planners in Eastern Nigeria seem clear - they did what they knew best: produce chicks, provide extension and veterinary support, and later compound and distribute cheap feed. The marketing segment, however, (in which the technicians had no experience) was neglected until comparatively late.

The scheme, in effect, merely stepped up, vastly, the magnitude of the activities which were already engaged in at the Abakaliki Poultry Center.

The method of planning employed in Eastern Nigeria has its strong points. Persons who must plan and those who must implement are linked together so that ends are not divorced from means. Also, the system allows those persons most knowledgeable with the technology

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have a substantial role in planning. Moreover, planning can be done realistically within known limitations of technical competence and feasibility. Conversely, however, the criticism can be made that too much attention may be paid to essentially technical matters at the expense of wider ones including economic feasibility.

If a scheme is to have meaning some criteria for judging its performance must be established. Targets and steps to reach those targets should be spelled out. If this is not done, the plan will likely manifest the insufficient internal consistency that follows from inconsistent or contradictory goals. Targets avoid this imbroglio by providing a clear definition of purposes and priorities - a statement of what is to be done and when - so that a coherent strategy can be established to allocate investment resources among competing demands. Without such clarity of purpose, and approach, plans run the risk of remaining vaguely aspirational statements rather than detailed designs to well throughout goals. In the case of the commercial egg project, no targets have been expressed in "quantitative" terms except those later put forward by the government hatchery relating to anticipated levels of day-old chick output. Although the primary purpose of the industry was to provide cheap protein, this goal has never been made explicit. A reasonable price has not been made specific. Neither has a planning period been specified. Consequently, planners do not know whether the retail price of 4/6 (.63¢) after three years is something

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No objective was specified regarding this program until after the FAO recommendations appeared in 1965 regarding the need to upgrade ^{21/} Nigerian diet. Then the regional government orally accepted the FAO objective of an egg per urban person per week as a desirable one for the industry. No calculation was made of the implications to the regional government in terms of needed subsidization of inputs or outputs, given this term of reference. Nor could they be until the costs of production of eggs were revealed.

Lacking these essential requirements regarding goals and provision to meet these goals, the poultry scheme cannot be termed a 'planned' project; it is really a program to introduce large-scale poultry rearing

^{21/} Agricultural Development in Nigeria: 1964-1980 (1965, FAO, Rome).

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B. The Scheme Begun - 1959-61

The decision to initiate the scheme was made in late 1959. Shortly thereafter, the regional government requested the United States Agency for International Development (USAID) to provide a poultry specialist ^{23/}to help organize and manage the scheme. The poultry specialist, C.L. Davis, arrived on the scene in February 1960. Davis toured the government farms; reviewed the situation, and prepared a survey of the problems and needs required by the project. He recommended that the deep-litter system (which had by now had three years of successful trials behind it), and the RIR (with nearly 30 years of Nigerian service) be adopted.

His general approach to the introduction of the industry on a ^{24/}commercial basis was as follows:

22/ The lack of clear-cut guidelines and priorities have had implications beyond a lack of targets. The MOA has made no clear distinction with respect to the role which private producers of inputs were supposed to play; or of the long-term intention of the MOA as to its continued presence as a producer. Government guidelines relating to the need for a scheme to be self-liquidating and those affecting the maximum level of subsidy have affected the freedom open to the MOA in planning the scheme. With guidelines the possible constraints deriving from these policies would have become more apparent. Moreover, the Federal Government's input tariffs on ingredients to ration have helped to keep feed costs higher than need be. Some region-federal government coordination on this score would have been very useful.

23/ Davis, C.L., First Terminal Report, 1962, USAID, PS 1. Technical aid is often suggested as opposed to solicited. The poultry project was a happy departure from this condition, and the circumstance was reflected in the close and whole-hearted support Davis received during his four years in Eastern Nigeria. So successful was Davis that he became affectionately known to, and remembered by, the public as "Chicken" Davis. Okpara asked that he be permitted to remain yet a further two years, but this was refused on grounds of USAID policy. Mr. Davis is currently with a Poultry Project in Morocco (1967)

24/ Letter from C.L. Davis to J. Okpara, 2/11/66

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"Poultry is an industry that all segments related to it must be developed simultaneously for it to succeed, i. e., chick and feed production, marketing, extension, follow-up visits to assist farmers with their problems and the publication of timely material related to poultry. Consequently, all problems were easily solved except; one, the availability of vaccines, and two, the failure to assign a qualified veterinarian to the project at Abakaliki to blood test and vaccinate the breeder flocks on time".

Davis then sketched out and put into action a six-point plan to meet these requirements across a broad front. The following steps 25/ were proposed, and taken.

1. Large-scale production of day-old RIR chicks was begun at newly established government hatchery at Abakaliki. Foundation stock was imported from the United States and United Kingdom and maintained at the Center. The chicks were sold unsexed to poultrymen at a subsidized price.
2. A simple feed mill was established at Enugu by the government, to provide feed which was also sold at a subsidized price. Ration outlets were provided in several locations in the region and the cost of transport to these outlets was not directly charged to poultrymen. Plans were later made (but still not carried out) to acquire a modern mill which would meet all the requirements of the region.

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3. The extension service was enlarged and adapted to provide technical advice to poultrymen.
4. Free training for farmers was made available at the Abakaliki Poultry Center. This was accomplished in a three-month course (since reduced to eight weeks) in both practical and theoretical poultry management.
5. The control and prevention of poultry disease was advanced by the development of a veterinary service that provided free vaccination and diagnostic support.
6. Widespread poultry and egg propaganda was begun to incite interest and stimulate egg consumption.

C. Foundation and Growth to the Present Time

The steps outlined by Davis envisioned the establishment of substantial segments of the commercial egg industry at a stroke. Nonetheless, the MOA with its lack of sufficient staff and finances, had to ^{26/} phase the introduction of the segments. The basic investment was made by the MOA in a large hatchery at Abakaliki which was viewed as the cornerstone of the industry, providing quality day-old chicks at subsidized

26/ A segment is defined to be any link in the productive process which involves the provision of some input or action towards the assembly of the final product which is given to be an egg on the consumer's table.

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prices to poultrymen. This first step was taken in 1961. It was followed in 1961-62 by the rather rapid development of the veterinary and extension services contingent to the industry. These services are provided free to poultrymen. In 1963, after having relied upon rations brought in from Western Nigeria, the MOA began operating its own feed mill at Enugu, which provided ration to farmers at a subsidized ^{27/}price.

Subsidization of inputs has been the primary incentive tool employed by planners to encourage private entrepreneurs to invest in commercial egg production. The level of subsidization has been fixed by a general public service principle which is to have the direct recipient of the service pay enough to cover the variable costs of production of the service, the government assuming the fixed costs and transportation charges as the subsidy. This policy has acted at once to reduce the cost of the service to the user and to place a floor as to the level to which a subsidized price may be set. Restated, this policy represents a ceiling as to the level of subsidy the government is prepared to support in achieving its nutritional goal. The saving to the farmer, with respect to feed, by using MOA feed is about 1.6d. per pound (assuming that

^{27/} The subsidized price is considerably lower than the price charged from the equivalent input produced by a private firm. MOA feed cost 3.2d. per pound whereas Pfizer sells at 4.8d. per pound. A day-old RIR produced at Abakaliki, unsexed, is sold at 17d., below by at least 3d. for a comparable bird by the nearest competitor.

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commercially sold feed prices reflect what the market value is under conditions of competition). This represents an important consideration to a producer in an industry where feed costs often represent from a half to two-thirds of his total cost of production per dozen eggs.

The industry began at a gallop in 1961-62 as Davis plunged into an extensive, personal and extremely successful campaign to popularize the poultry industry. Perhaps as many as 800 persons made some attempt to produce commercial eggs in the first five years of the industry (Table 2-1). A private feed producer and several private hatcheries entered to supplement the MOA effort and take advantage of the rapidly growing market. This rate of entry by private persons into egg production was reflected in the seemingly insatiable market for day-old chicks, whose production rose very quickly until January 1965 when disease struck the hatchery causing all the flocks to be removed. The flocks have since been restored but production has never recovered its previous peak. Feed production beginning in 1963, had reached 5600 short tons by 1966 when a severe maize shortage caused production to fall steeply in that year. Veterinary support has become widespread and quite reliable.

Egg production followed the availability of feed and hens (Table 2-2), the high point being reached in July 1965 when an estimated 182,500 dozens were produced. Domestic production almost completely displaced the

Table 2-1

Annual Egg, Feed and Chick Production in Eastern Nigeria 1961-66

Year	Total Number of day-old Chicks Produced	Tons of Feed Produced	Estimated Dozen of Eggs Produced
1961	29,633	-	5,264
1962	62,731	-	177,000
1963	143,429	1,134	395,000
1964	369,068	3,961	972,000
1965	116,741	4,567	1,913,000
1966	250,711	Approx. 5,600	781,000

This table was prepared by the author from figures obtained from the MOA, private hatcheries and Livestock Feed Ltd., 1966-67.

TABLE 1. Estimated population of the American bison, 1961-1966.

Month	1961		1962		1963		1964		1965		1966	
	hens	cess	hens	cess	hens	cess	hens	cess	hens	cess	hens	cess
	3970	4963	16000	20000	41000	51250	120000	150000	85000	106250	106250	106250

Table 2-2

Number of Hens and Levels of Eggs Production (estimated in dozens) in
Eastern Nigeria since the Beginning of the Commercial
Egg Scheme 1961-1966

Month	1961		1962		1963		1964		1965		1966	
	hens	eggs	hens	eggs	hens	eggs	hens	eggs	hens	eggs	hens	eggs
Jan	-	-	3970	4963	16000	20000	41000	51250	120000	150000	85000	106250
Feb	-	-	5770	7213	18000	22500	43000	53750	126000	157500	76000	95000
March	-	-	7120	8900	20000	25000	47000	58750	132000	165000	67000	83750
April	-	-	8920	11150	21600	26250	51000	63750	133000	166200	62000	77500
May	-	-	10000	12500	22300	27100	54000	67500	136000	170000	56000	70000
June	-	-	12000	15000	25000	31250	56000	70000	143000	178750	45000	56250
July	-	-	14000	17500	28000	35000	58000	72500	146000	182500	38000	47500
Aug	-	-	15000	18750	29000	36250	66000	82500	138000	172500	38000	47500
Sept	-	-	16000	20000	32000	40000	75000	93750	129000	161250	39000	48750
Oct	270	338	17000	21250	33000	41250	84000	105000	120000	150000	40000	50000
Nov	1470	1838	16000	20000	36000	45000	95000	118750	109000	136250	40000	50000
Dec	2470	3088	16000	20000	38000	47500	108000	136250	99000	123750	41000	51250

The number of hens on litter represents an estimate based on the hatch records of all hatcheries (public and private) less males and mortality such that 40 percent of hatch became point of lay hens and assuming a typical laying life of sixty weeks. It is assumed that each hen lays 180 eggs during its laying life.

Calculated by author from MOA records and records of private firms.

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imported product by 1965. No record is available of egg prices over this period. However, it is known that from a high of some 7/- (.98) in 1960, egg prices fell to as little as 2/6 (.35) by 1964, the time of greatest production. Prices for eggs seem to vary a great deal by area, and fluctuated rather widely in time as well. The prices of eggs purchased at the farm gate in the neighborhood of Enugu from January 1966 to January 1967 were found to vary as much as a shilling; or six pence above and below an average price of 4/- (.56). A dozen eggs at a cold storage in Enugu were found to be somewhat higher, 4/6 (.63). In Port Harcourt prices were higher, likely a function of greater demand (reflecting that cities relatively with high degree of industrialization and larger expatriate community). Port Harcourt prices reportedly have been rather stable despite increasing availability of eggs in the city (although price per dozen eggs of as much as 5/6 (.77) is not unknown), 5/- (.70) is the typical price in this market. Suppliers to the Port Harcourt market may be as far away as Owerri, Ahoada or the cross river country; but many large producers cluster closely about this market area.

The slump in egg prices in 1965 was of sufficient severity to cause many producers to leave the business. Others found the shortages of chicks and feed in 1965-66 more than they were prepared to cope. As a result of these three crises, the industry has now fewer producers

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than at any time since perhaps 1962 (about 350). As of January 1, 1967 there were somewhat more than 40,000 layers producing 50,000 dozen eggs monthly. Chick production has been reestablished. The critical maize shortage remains a problem. Egg prices, however, have become a sufficient issue that the government in early 1967 undertook an egg price support scheme'. It is still too early (spring 1967) to note the effectiveness of this program, however, it seems fair to say that the government itself has entered into it with mixed feelings. This attitude is partially due to some disillusionment with the commercial egg project's even establishing itself on a firm economic base, free of support and yet able to meet its nutritional objectives.

It is, moreover, necessary to recall that subsequent to mid-January 1966 Nigeria underwent a series of governmental changes. Eastern Nigeria came under a military government which came into office determined to critically review many ongoing programs. The poultry scheme, being very much identified with the former government, came in for an especially critical review. The wisdom of continuing outlays, through subsidies, received special criticism. The military government asked how a cheap egg could ever be produced when many poultrymen were unable to typically breakeven with subsidized feed, chicks and veterinary support when prices were (1966) about 4/- (.56) per dozen!

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Summary

Since 1970, the number of people who have been killed in the United States by firearms has increased by more than 50 percent. The number of people who have been injured by firearms has increased by more than 100 percent. The number of people who have been killed by firearms in the United States is now more than 10,000 a year. The number of people who have been injured by firearms in the United States is now more than 100,000 a year. The number of people who have been killed by firearms in the United States is now more than 10,000 a year. The number of people who have been injured by firearms in the United States is now more than 100,000 a year.

On the other hand a considerable vested interest in the MOA existed which asked to give the scheme another try, and to extend support to struggling farmers with a price support scheme; although such price supports (practically speaking) meant the end of the commercial egg scheme as a cheap protein venture. Such a scheme was initiated in April 1966 and then allowed to lapse after July when the region's money became more needed elsewhere. From this time forward the outlook for the commercial egg industry became darkened by the gathering clouds foreshadowing the events of May 1967, and thereafter.

5. Summary

Since 1919 exotic poultry stocks have been introduced and reared successfully in Southern Nigeria. These successes eventually stimulated, in the late 1950's, a desire to develop an indigenous commercial egg industry to help provide a cheap protein food. With the guidance of an American poultry specialist, C.L. Davis, an impressive beginning has been made. By 1967, some 350 producers have hens on deep-litter. Two feed mills (one privately owned) function; but on unreliable supplies of maize. One public and several private hatcheries produce hybrids and RIR type hens in sufficient quantities to meet current demands. A veterinary service has reduced mortality levels to a very low point. In certain areas, a small market has been won. Subsidies continue on feed and chicks while veterinary services remain free. Finally,

a beginning has been made towards rationalizing the market structure with the introduction of a publically sponsored price support and marketing scheme which, by implication, meant that the regional government has conceded its nutritional goal in favor of a smaller but more viable industry, which would become less dependent upon public largess.

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CHAPTER 3

THE ORGANIZATION OF THE COMMERCIAL EGG INDUSTRY

"A hen is an Egg's way of making another Egg".

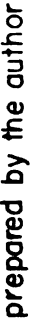
Samuel Butler
Life and Habit, 1877

1. Introduction

This chapter will describe the segments of the commercial egg industry; (as of spring, 1967) noting the location of its supporting components, its markets, and its essential economic geography. It will review the present status of each segment of the industry from the supply of maize, chicks, and ration through the production and marketing of commercial eggs to the final consumer. Within each segment, note will be taken (where relevant) of the degree of buyer and seller concentration, the problems of entry and exit, the segment's capacity, and its more salient problems.

2. Economic Geography

Since 1961 the commercial egg industry has spread its economic influence over a wide area of Eastern Nigeria (Map 1); elements of it may be found in virtually all of the region's twelve provinces. Perhaps 1500 persons presently derive most of their livelihood from some segment



of the industry; either as a feed mill hand, maize grower, producer and farmhand or clerk at a retailing kiosk.

The structure of the industry (Figure 3-1) reveals the producer to be the focal point of a great deal of activity. He is the buyer of finished ration, day-old chicks, and equipment; and he is the user of free veterinary and extension services. There are, moreover, other segments standing behind each of these inputs.

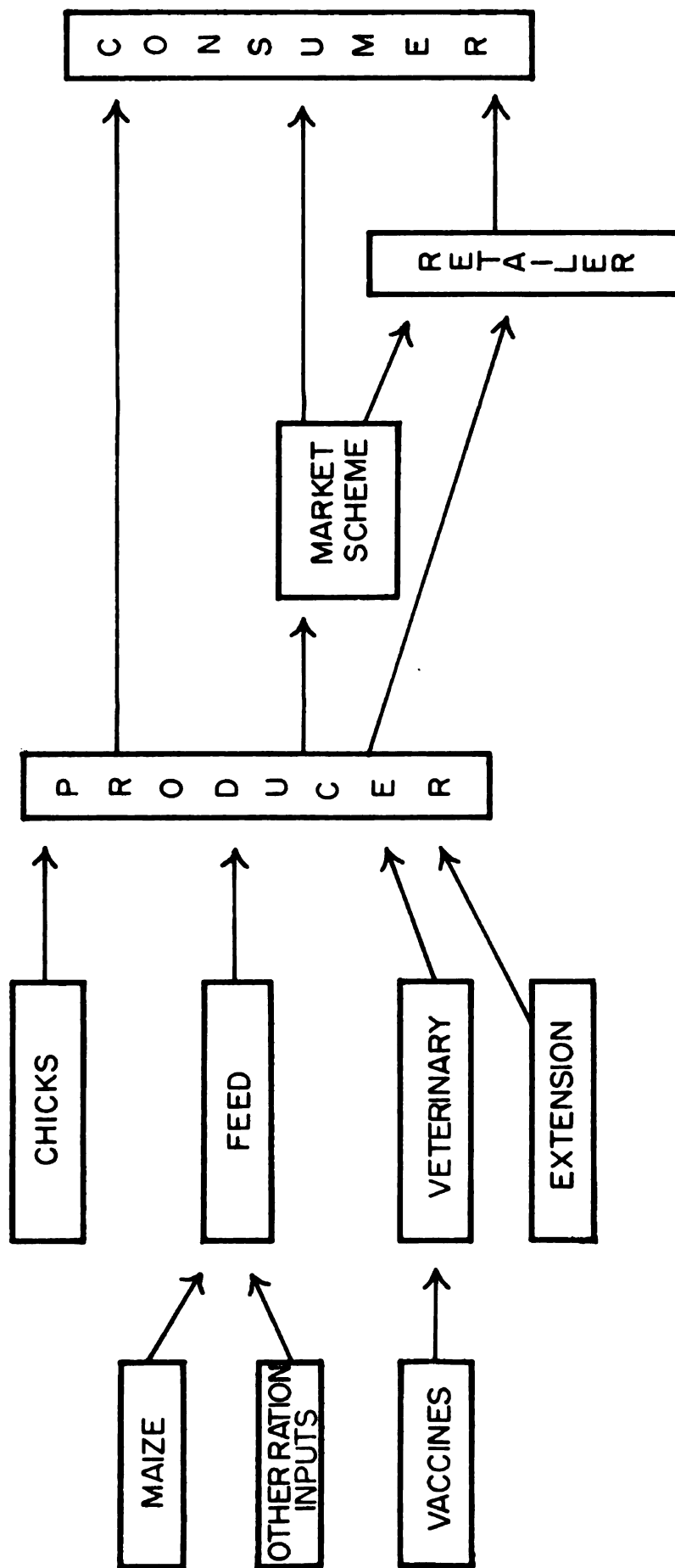
Maize is, by weight, the most important ingredient of poultry ration. Until 1966 most maize was imported from the Northern Region (Map 2). As a result of the acute maize shortage of that year, the Eastern Region has decided to encourage domestic maize production. Such production is just beginning, centering in the north-eastern portion (and especially in Ogoja province) of the region where the MOA is constructing granary installations (locally called silos). Other ration ingredients; oyster shell, terramycine, fish meal, and trace elements must be imported into the region; and in the latter two cases into Nigeria.

Supplies of maize are purchased by one of the region's two feed mills; government's at Enugu, and Livestock Feed Ltd. (Pfizer) at Aba. Farmers tend to purchase the ration produced in the mill nearest to them, although some of each type of feed can be found in the market area other than where it is produced. MOA feed has an economic advantage being sold at a subsidized price. The Pfizer product tends

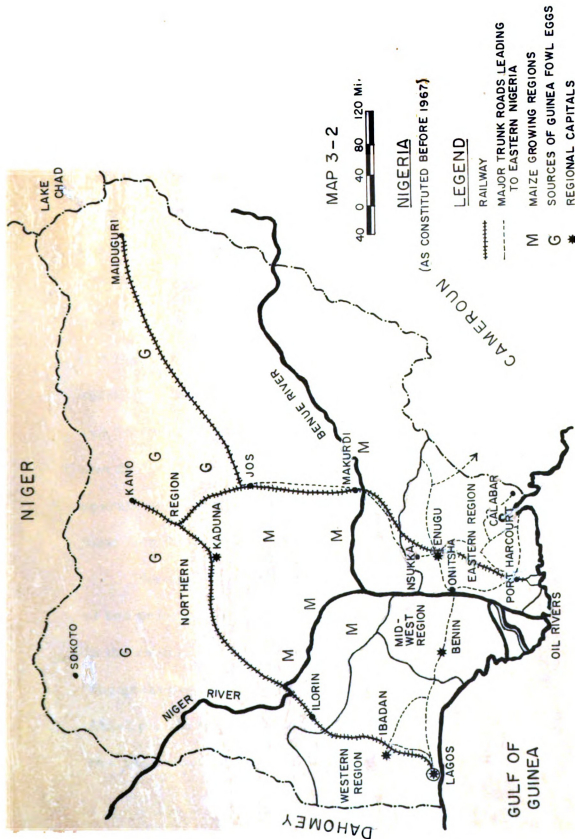


FIGURE 3-1. STRUCTURE OF THE COMMERCIAL EGG INDUSTRY OF EASTERN NIGERIA

FIGURE 3-1: STRUCTURE OF THE COMMERCIAL EGG INDUSTRY OF EASTERN NIGERIA
INDUSTRY OF EASTERN NIGERIA



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to be restricted, on grounds of transport cost to the south, in part of the region, however, the uneven level of MOA production and quality has given some edge even in the northern marketing area.

Poultry vaccines, were produced at Vom, Northern Nigeria, but are now scheduled to be produced at Enugu, after April 1967. Training and technical assistance remain centered at the Abakaliki poultry center.

The economic areas of the hatcheries are not so clearly defined. If a hatchery has its own truck it can service a much wider area than it it has to depend upon its consumers coming to the hatchery. In addition to the MOA hatchery at Abakaliki, a large private firm, Ejinaka and Thornber, operates at Aba. Both of these units distribute their own day-old chicks throughout the region. Three small hatcheries operate at Onitsha and sell mainly in the northern area, without having their own distribution systems.

The egg industry is bi-polar, with producers focusing upon one of two principal markets, Enugu-Nsukka in the north and Port Harcourt in the south. Producers operate in all twelve provinces (Table 3-1). The great majority, in the south, cluster along the line Port Harcourt-Aba-Uyo. In the northern market the density of producers is greatest in a band running Abakaliki-Enugu-Onitsha.

Table 3-1

Poultrymen Possessing 100 or more Birds, by Province in
Eastern Nigeria

Province	No. of day-old chicks vaccinated, classified by scale of operation								Total
	100-300	301-500	501-700	701-1000	1000-4000	4000+			
Abakaliki	23	9	3	3	1	*		39	
Annang	9	4	1	*	*	*		14	
Enugu	15	3	3	5	2	*		28	
Onitsha	28	7	5	4	4	*		48	
Owerri	41	11	5	4	3	1		65	
Port Harcourt	25	8	4	5	1	2		45	
Umuahia	59	13	4	1	6	2		85	
Uyo	10	4	4	6	*	*		24	
Total units serviced by scale of operation	210	59	29	28	17	5		348	

Prepared by the author from veterinary records examined in 1966.

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1. Outline

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Prior to 1967, farmers had to individually find their own marketing outlets. Eggs were mainly sold at local markets, ungraded. When transport permitted, the farmer tried to move them to a city. Geographic dispersion of producers has been a heavy burden to the development of a modern industry. Inevitably, many poorly located firms (and there have been many of them) felt adverse markets first and most violently so that a number have gone out of business.

Jobbers have supplemented a difficult marketing situation, but inadequately. Regular supplier-wholesale-retail contracts have come slowly. Storage and safe transportation facilities are still in their infancy. It was to help this difficult situation, and to provide aid to vociferous, but ill-sited farmers, that the egg marketing scheme was begun in 1967.

The egg marketing scheme has so far operated exclusively in the northern (Enugu) market area. Eggs are collected from many points in the area, some of them quite remote, and transported to a collection center in Enugu where they are processed, graded and marketed. Plans to establish a second station at Port Harcourt have not yet materialized.

3. Outline of the Productive Process

At least seven separate types of "input" must be provided on a continuing basis if commercial eggs are to be made available to the final

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consumer: maize, poultry ration, day-old chicks, veterinary support, credit, management of egg producing flocks, and the egg distribution and marketing system. Each of these segments will be examined.

1/
A. Maize Production and Marketing

Although a beginning has been made in regional production of NS-1 maize, most (over 95%) of the quantities needed by the local feed mills must be imported from outside the region. The major source of maize has been numerous small farms located in the "Middle Belt" which is a broad east-west section of Nigeria including the Benue and upper Niger river valleys (Map 2).

Maize producers sell their small individual lots of yellow maize to one or several of the numerous petty jobbers active in the trade. Several levels of middlemen operate between farmer and miller, each moving the maize a step along the marketing chain. Despite this activity, millers of ration compounds have experienced great difficulty in obtaining sufficient maize.

Maize becomes available in December and January. The miller must himself buy and store the commodity then as contractors rarely have suitable storage facilities. But storage is a problem. Pfizer claims

1/ The background to the maize problem is covered in greater detail in the appendix. The data in this section was given orally by Mr. Russell Gillham, Manager, Livestock Feed Ltd., Lagos.

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that it costs £10 (\$28) per ton, which includes the bank overdraft on the substantial investment in inventories.

Notwithstanding the problems of collecting and moving maize from the widely dispersed maize producers feed needs were met until 1965. Producers had apparently responded to rising demands for maize by poultrymen in Southern Nigeria and increased their plantings. By 1965, however, demand moved considerably beyond what farmers were willing or able to produce. The view is held by millers and the MOA, that these essentially subsistence farmers had reached the limit of acreage they were willing to devote to non-subsistence crops. In response to what has come to look like a permanent shortfall in maize supply, the Eastern Region Government is considering encouraging maize production by a price support system.

2/

B. Provision of Poultry Ration

3/

Production of poultry ration is unequally divided between the MOA mill and the private compounder. Both mills buy maize from the same sources and experience common difficulties obtaining it. Each mill tends

2/ The data in this section was gathered orally from Mr. Russell Gillham, Manager, Livestock Feeds and from Mr. D.N. Ajaegbu, Principal Agricultural Officer, MOA.

3/ Total annual feed production, by all producers, in Eastern Nigeria is shown in appendix H.

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to dominate the market in its area in Eastern Nigeria. Persistent rumour^{4/} has suggested the establishment of a third private mill. However, neither the maize supply, nor the present institutional and market constraints (specifically the MOA's determination to continue its role as a feed producer) would support a third feed mill.

The market division that presently exists reflect a combination of economics and competitive effort. The MOA, which assumes all transport costs in addition to selling a subsidized product could, if it wanted, under-sell Pfizer anywhere in the region. Pfizer, having to push transport costs forward to consumers, is limited to the southern portion of the region. Although it has outlets all over the region, Pfizer sales are concentrated in the Aba, Umuahia, Port Harcourt, Uyo areas. The MOA has made no serious effort, however, to distribute more than token quantities in the south and as a result much of this market is left open to the private firm.

A second factor has also permitted the producer of the relatively more costly private product to remain a competitor. The manual mixing techniques used at the Enugu mill have allowed variations in feed quality of some considerable degree. Although the formula in use is satisfactory, the degree of supervision over the use of ingredients and over the men

^{4/} The author prepared a survey of the prospects for such a mill for Arthur D. Little Co. A synopsis of the findings appear in appendix G, with their permission.

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with the mixing shovels leaves something to be desired. Farmers have noted variations in the quality of MOA ration purchased, and have responded by buying the more expensive Pfizer ration (which is mechanically mixed). Other farmers buy Pfizer concentrate and mix their own feed. Still others mix the two feeds together.

The levels of output so far attained by the MOA is far short of the total required by the industry. The regional mill has an estimated daily capacity of 12 tons. Pfizer, has a daily capacity of 15 tons. If all these sources were used to capacity five days a week they could produce something in excess of 8000 tons of ration annually, but this level of output has never been attained (See Table 3-2).

5/
C. The Chick Input

Considerably more firms function in the provision of day-old chicks to poultrymen, reflecting relatively easy entry, the wide variety of breed types and qualities available, and the extent of the final market for chicks.

The MOA-operated hatchery at Abakaliki is the oldest and largest operation having distributed over 700,000 day-old chicks (RIR) to poultrymen since it began operation in late 1961. The hatchery has the capacity to produce half a million day-old chicks annually. Although it distributes a dual-purpose unsexed bird, the relatively low price (1/6 or .21) and

5/ The data in this section was gathered from interviews with the managers of all the hatcheries, private and public, presently operating in Eastern Nigeria (1966).

Table 3-2

Total Annual Feed Production in Eastern Nigeria,
by Producer

(in short tons)

Producer/Year	1963	1964	1965	1966*
MOA	1134	1484	1638	1076
Pfizer	-	2477	2929	4500*
Total	1134	3961	4567	5605

* Including an estimated output of 300 tons for December 1966.

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lack of supply of alternative stock has allowed Abakaliki to remain the most important single chick producer in the region. MOA-RIR are found in every province; and almost every poultryman has had some experience with them.

The MOA product has in-turn been adopted as the foundation stock by three private entirely Nigerian-owned hatcheries, ^{6/}Lincolndale at Onitsha and Aba; and PAC and Chukwurah at Onitsha. Together these three firms share no more than 21 percent of the market. They all offer unsexed RIR or "mixed" birds largely to the Northern portion of the market. Lincolndale has promoted its product aggressively and has been relatively well-financed and managed. But these three firms have experienced increasing difficulties in holding their share of the market. Doubtless the MOA's problems with disease at Abakaliki have helped private hatcheries (Table 3-3).

The largest private hatchery in the region is Ejinaka and Thornber of Aba. As the name suggests, it is a Nigerian - expatriate partnership. It entered commercial production in early 1966, offering sexed hybrid chicks delivered to the farm gate. The hatchery is located in the midst of a large cluster of poultry farms and is near Livestock Feeds Ltd. It is also central to the rail and highway communications within the region.

^{6/} The hatchery segment has been the scene of an interesting manifestation of local entrepreneurship, covered in the appendix.

Table 3-3

Total Annual Output of Chicks up to December 1966 in
Eastern Nigeria by Commercial and Public
Hatcheries

Year	Producers				Total
	MOA	Lincolndale	Ejinaka & Thornber	Others*	
1961	29,633	-	-	-	29,633
1962	62,731	-	-	-	62,731
1963	143,429	-	-	-	143,429
1964	328,776	28,292	-	12,000	369,068
1965	28,241	76,500	-	12,000	116,741
1966	108,491	41,946	88,274	12,000	250,711
Total	731,301	146,738	88,274	36,000	

* No records have been kept by PAC & Chukwurah, but shortages of hatchery eggs and maximum capacity suggest no more than 2,000 day-old chicks per month.

Compiled by author from records provided by the firms.

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The firm has made available, for the first time in Eastern Nigeria, quantities of sexed, hybrids, egg-specialist stock. The early success of this company in introducing a significantly more expensive bird (4/2.8d. each or .59¢) has caused the MOA and the other hatcheries to reconsider their emphasis on dual-purpose stock.

The Ejinaka and Thornber hatchery has considerable equipment located in a modern building; four incubators of 18,000 capacity each and four hatchers of 6,000 capacity each. A breeding flock is kept near the hatchery which is replenished three times a year with a new parent flock from the United Kingdom. All chicks are color-sexed and sold as sexed day-olds. A growing market is being won by these single-purpose birds, and perhaps 20 percent of all farms have them now.

Source of All Hens Presently on Litter
(1966)

MOA	44 percent (RIR)
Ejinaka & Thornber	35 percent (Hybrid)
Lincolndale	16 percent (RIR)
PAC and Chukwurah	5 percent (RIR)
	100 percent

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Poultrymen in their demand for day-old chicks have persistently kept ahead of supply. This demand, associated with the decline of output from Abakaliki, has led producers to be uncautious consumers so that some very poor flocks have been put on deep-litter as egg producers. It seems clear that with one egg specialist hybrid available in quantity, and with growing experience in poultry management, the market will make a substantial shift to sexed chicks and specialist stock.

Originally, the MOA opted for the dual-purpose bird on the ground that the extra income from the cockerels would be a useful sideline to poultrymen. In practice, however, it has been very difficult to sell large numbers of cockerels at 12 weeks of age (when they should be disposed) and farmers have often found themselves with flocks of males in excess of 20 weeks of age. This rather typical experience is putting pressure on hatcheries to sex their chicks. Small hatcheries, unequipped to do this, may on this account fail in the long run.

7/
D. The Veterinary Factor

Government veterinary services are provided free to poultrymen. The very real threat of fowl epidemics was one of the inhibiting factors that had to be overcome before a commercial poultry industry could be

7/ The material in this section was obtained orally from Dr. Frank Siccardi, Veterinarian, Faculty of Agriculture, University of Nigeria, Nsukka, and from a general reading of the records of the Veterinary Service, MOA, Enugu.

successfully introduced. Mortality among flocks on government farms in Eastern Nigeria in 1960 was as high as 60 percent. Today the figure is 15 percent. The government recognized this problem in the early 1960's and included an expansion of veterinary services in the Eastern Nigeria Development Plan under project 13.

"... for the expansion of Veterinary Services, the objectives of project 13 are to turn out large numbers of inoculators, to give existing staff refresher courses (for which existing facilities need to be expanded)....", "... The Veterinary Training School will be expanded to train more Veterinary Assistants...." 8/

This project has been implemented. The Chief Veterinary Officer reports that veterinary services are widely available throughout the region; thirty-eight stations staffed by nearly 140 veterinary superintendants, clerical assistants and other staff. This group is supported by a USAID veterinary advisor and a pathologist.

The success in developing this widespread service has been acknowledged by poultrymen, 70 percent of whom, when asked of their problems in obtaining veterinary services, reported having no difficulty (Table 3-4).

A number of services are provided to farmers: (1) diagnosis of diseases, (2) treatment of diseases, (3) inoculation, (4) advice to farmers

8/ Eastern Nigeria Development Plan, 1962-68 (Enugu: Government Printer, 1962), page 32.

Table 3-4

Problems of obtaining Veterinary Services - reported by
Respondent Poultrymen

Problem Cited	Proportion Reporting
No problems	70
Transport difficulties	16
Some drugs not available	5
Not available when needed	5
Veterinary comes by rarely	2
Poor service in general	2
Total	100

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with respect to health practices, (5) supervision of imported chickens (into the region), (6) sanitation and detection of diseases. Farmers have reported that diagnosis of diseases has been less than satisfactory, in that the time lapse between seeing a bird die and a diagnosis returned can be considerable - even several months. Local veterinarians attribute this to the shortage of staff and facilities. The inoculation program alone keeps the staffs fully occupied. All day-old chicks sent out from Abakaliki are inoculated, and a subsequent second inoculation is also required. However, Sheppard argues that the staff of 140 veterinary superintendants, clerical assistants and other persons ought to be sufficiently adequate to more than handle all present claims upon it, if efficiently utilized.^{9/}

E. The Credit Factor

In 1963 the Eastern Nigeria Government established a fund for Agricultural and Industrial Development (FAID), to finance loans to farmers and businessmen. This fund remains the only important institutional source of credit to poultrymen. Since 1963 (up to mid-1966) the poultry industry has received £ 23, 709 (\$66, 360) or about 7 percent of the total amount advanced for all purposes; some £ 350, 000 (\$980, 000).

To be eligible for a loan, a farmer must have kept 250 layers in a deep-litter house and have had at least six months experience in the poultry business. The use of the loan is closely supervised and, when

^{9/} Dr. Charles Sheppard is a poultry specialist with Michigan State University, formerly on the staff of the University of Nigeria, Enugu.

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possible, credit is extended in kind - chicks and feed - rather than cash. Cash loans are extended only where the intended purchases are not provided by the MOA, or a purchase order is not honored by a supplier.

Although loans have been available since August 1963, the first loan to a poultry farm was not made for nearly a year. Up to July 1966, some 389 applications for loans had been received from poultrymen of which 21 had been approved. The recorded distribution of these applications and loans are as shown (Table 3-5).

10/
F. The Producer of Commercial Eggs

Although entrepreneurship in the commercial egg sector will be examined in some detail in the following chapter, a general over-view is presented below to represent the poultrymen as a group comprising the vital segment of the industry and the focus of most of the attention of this thesis.

Producers of commercial eggs are found in every province of the region. However, some 60 percent of them operate farms possessing less than a thousand birds. In terms of numbers of hens in production in each marketing region, some 55 percent appear to be in the northern area around the Enugu market and 45 percent oriented towards Port Harcourt.

10/ The data in this section was developed from personal interviews with farmers by the author, and from a general questionnaire directed to 100 producers, described in the appendix.

Table 3-5

Applications for, and Awards of, Credit for Poultrymen in
Eastern Nigeria

Province	No. of Applicants	No. of Loans Made	Value of Loan
Abakaliki	30	4	£ 3,213
Annang	21	-	-
Calabar	2	-	-
Degema	1	-	-
Enugu	60	5	4,203
Ogoja	11	1	1,015
Onitsha	69	8	11,256
Owerri	65	2	2,648
Port Harcourt	20	-	-
Umuahia	60	1	1,374
Uyo	39	-	-
Yenagoa	11	-	-
Total	389	21	£ 23,709

Data compiled by author from records of FAID in Enugu, 1966.

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Entry into the business is not difficult - perhaps as little as £100 (\$280) would suffice to establish a house, rear a small flock and hire a single helper. Larger scale activities (500 birds or more) require at least £350-400 (\$980-1120) to enter the business and rear a flock to point-of-lay. Exit is somewhat more difficult when a laying flock is on litter. In practice an exiting poultryman may let all his layers play out their active lives and not replace them with new grower flocks. The countryside is dotted with the skeletons of former chicken ventures.

There are at present approximately 320-350 producers who have at least 100 layers. It is difficult to estimate how many persons have been in the business since 1961. The survey made of producers presently in production, as well as government records, suggest that, in all, some 800 separate producers have been active in commercial egg production. The withdrawal of some 500 poultry farms over a six year period can be explained in large part by the history subsequent to the establishment of the industry in 1961; sharply falling prices since 1962, difficulties in obtaining stock in 1965, shortages of feed in 1966, and less than hoped for rates of return on investment reported by many poultrymen interviewed in the course of this study.

11/ Almost all producers use the deep-litter system. However, a small number of battery cage operations are known to exist around the Port Harcourt area. One open range farm was found in Enugu province.

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G. Marketing Commercial Eggs

The egg marketing system in Eastern Nigeria may be considered in two phases. The first covers the period 1961-66 when a "free" market existed for eggs - when producers had to sell their own produce, and develop their own outlets and sources of market information. The second period began when the government price support program was introduced, after the first system had clearly failed to cope. A third period may be opening as this publically supported scheme is handed over to the poultry producers cooperative organization.

The experience of the early phases of egg marketing have been remarked upon in several places above. It seems fair to say that planners assumed that marketing would take care of itself as the traditional propensity for trade asserted itself. To whatever degree of such practices did in fact occur, these appear to have been swamped by the unheard quantities of eggs which came into the market once the products of Abakaliki went into full lay. Nothing in local experience prepared Nigerians to cope with quantities of eggs measured in the tens of thousands of dozens. Existing local markets were soon satiated, and facilities did not exist to store or transport the

12/
balance.

The lessons of the first four years of the poultry project have been clear; marketing channels, information structure and efficiency must be sufficiently developed to cope with the volume of egg production forthcoming from the modern commercial egg industry.

To begin to meet this wide and stubborn array of problems, the Executive Council (in 1964) directed the Ministry of Commerce to

12/ Prices for commercially produced eggs have been on occasion severely affected by competition from the government supplied farm settlements and the Eastern Nigeria Development Corporation (ENDC).

Farm settlements, of which there are six, are another agricultural development program of the Okpara regime. To help settlers earn a supplementary income before their regular cash crops come into production, poultry enterprises were established on some of the settlements. The original scheme was to advance each settler 50 chicks, as well as feed, which he would repay from the proceeds of egg sales. This program was begun in 1964-65 on five settlements (Boke, Erei, Igbariam, Ohaji and Ulonna) when each were given 3000 day-old chicks (RIR) from Abakaliki. The settlements raised these up to about twelve weeks of age in a central brooder house and then distributed the growers to the settlers who had constructed small houses to receive them. When egg production began the eggs were received by each settlement's cooperative store which in turn sold the eggs into the open market. It is at this point that the scheme came into conflict with non-settlement private producers.

To dispose of these eggs, government officials in Enugu associated with the farm settlement scheme resorted to very aggressive sales procedures which caused egg prices to fall as low as 2/6 (.35¢) per dozen but more typically to 3/- (.42¢) per dozen. This situation was temporarily ameliorated by the cessation of supplies of chicks to the settlements in 1965-66. However, at the present time some 30,000 sexed layers from Agege, Western Nigeria, have been put into farm settlements, which birds will once again produce quantities of eggs that may be centrally marketed.

prepare a government managed marketing organization to handle collection,
transport and distribution of eggs from farms to urban areas.^{13/} The goal
of the proposed organization is to ensure that both producers and consumers
are assured of ready markets, stable supplies and "fair" and stable
prices. The regional marketing scheme was designed to serve the
following purposes:

1. Reduce the distributive costs both to farmers and consumers.
2. Enable farmers to use their time more effectively by being
relieved of the problems of marketing.
3. Ensure the regular movement of eggs from the producers to
consumer areas.
4. Raise and maintain the quality of eggs produced in Eastern
Nigeria.

In practice, the scheme collected and assembled eggs from producers
and transported these to the main collecting point of marketing in the
northern part of the region. A second collection point was planned at
Port Harcourt but never opened.

At the collection point, eggs are graded, stored and eventually
distributed either directly through marketing scheme kiosks or to retailers.

^{13/} The material presented relating to the cooperative marketing
scheme was given me orally by Mr. Frank Moore, FAO technical
consultant on poultry marketing to the regional government. The
use of the term 'cooperative' is euphemistic, expressing a long-
term hope. In fact, it is entirely government sponsored and operated.

The scheme was designed to buy all the eggs produced at set prices.

The scheme set-up collection routes with specific egg collection points along them. Farmers are responsible for bringing their eggs to these points - from which they may be collected in a government van once or twice a week.

Farmers were not paid until their eggs had been graded, a fact which became a source of irritation when payments were delayed as often happened. Mixed eggs received from farmers were paid at the rate of 3/6 (.49¢) per dozen. If the eggs were delivered to a storage station (Enugu, Abakaliki, Aba, Onitsha, Port Harcourt, Umuahia, and Uyo) an extra 2d. was added.

The scheme in turn retailed these eggs, graded, at the following prices:

<u>Grade</u>	<u>Per dozen without carton</u>		<u>with carton</u>	
Extra large	4/-	(.56)	4/6	(.63)
Large	3/9	(.53)	4/3	(.60)
Medium	3/6	(.49)	4/-	(.56)
Small	3/-	(.42)	3/6	(.49)

If the eggs are sold to a store a reduction of 3d. per dozen eggs is registered.

As originally planned the scheme was to be run by the government for a period of at least three years and then handed over to the Eastern Nigeria Farmers Cooperative. In fact, this schedule has been radically accelerated. The scheme, as sketched above, went into operation in February-March 1966 shortly after the Nigerian army assumed control of the country. Eggs were purchased as planned and egg prices were stabilized at about $3/6$ (.49¢) per dozen at the farm gate. Many farmers, of course, took the large eggs from their output and sold these independently while giving the balance to the scheme. Nonetheless, the scheme took in large quantities of eggs and in fact exhausted its initial capital of £ 30,000 (\$84,000) allocated for egg purchases as a revolving fund. Sales proceeds were unable to cover these outlays - consequently egg purchasing was halted in April 1966 and reopened again some weeks later after inventories had been cleared.

By June 1966, only two months after the recommencement of the operation, substantial volumes of eggs were again on hand (Table 3-6 and 3-7). In November 1967 the prices paid and asked by the scheme were somewhat altered (Table 3-8). The principle criteria used for setting these prices was to obtain the best prices consistent to clear stocks of eggs held by the scheme.

Table 3-6

Eggs Grades into Stock by the Eastern Nigeria Marketing Scheme,
April 1966 to June 1966

Grade	Quantity in Dozens	Percent of Total
Extra Large	1, 223	4
Large	8, 668	28
Medium	13, 453	44
Small	7, 422	24
	30, 786	100%

Data compiled by the author from material made available by the
FAO Poultry Marketing Advisor, 1967.

Table 3-7

Intake and Sales of Eggs by the Eastern Nigeria Marketing Scheme
April 1966 to September 1966

Month	Purchases in Dozens	Sales in Dozens
April	15,325	10,648
May	9,728	12,426
June	6,924	7,797
July	4,036	3,905
August	12,820	6,241
September	10,502	10,262
	<u>60,229</u>	<u>51,279</u>
	Inventory on hand	+ <u>6,857</u>
	Broken, crushed, dirty, etc.	+ <u>1,893</u>
		<u>60,039</u>

* The net difference between intake and sale is due to stock in hand (April).

Data compiled by the author from material made available by the
FAO Poultry Marketing Advisor, 1967.

Table 3-8

Prices Paid and Asked by Marketing Scheme After
November 1966

Size	On Farm	At Depot	Wholesale		Retail	
			No Carton	With Carton	No Carton	With Carton
Extra Large	3/6 (.49)	3/9 (.52)	4/- (.56)	4/3 (.60)	4/3 (.60)	4/6 (.63)
Large	3/3 (.46)	3/6 (.49)	3/9 (.52)	4/- (.56)	4/- (.56)	4/3 (.60)
Medium	3/- (.42)	3/3 (.46)	3/6 (.49)	3/9 (.52)	3/9 (.52)	4/- (.56)
Small	2/6 (.36)	2/9 (.40)	3/- (.42)	3/3 (.46)	3/3 (.46)	3/6 (.49)

Data compiled by the author from material made available by the FAO Poultry
Marketing Advisor, 1967.

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H. The Consumer

This section will briefly identify the consumer of commercial eggs, five years after the inception of the scheme. Prior to 1960-61 the consumer is believed to have been typically an expatriate. This belief is predicated by the high prices charged for eggs. Egg eating seems to have been a British custom which came to be imitated by Nigerians. Although eggs have been eaten, their popular consumption (fried and as omelette) had to await the introduction of suitable cooking utensils. Prior to this eggs went into the pot along with other ingredients or were served hard-boiled.

Surveys taken in Calabar, Enugu, Onitsha and Port Harcourt suggest, that regular egg consumption is still concentrated among the higher income groups, and expatriates. Significantly, the most robust market is Port Harcourt where the largest foreign community reside. Egg consumption was also found to be strongly influenced by education. People with higher educations, even with less income, seem to buy more eggs than less educated people who warn more. Price seems to be the most important constraint to increased egg consumption, reflecting the high income elasticity of the commodity; 74 percent of the respondents said they

14/ The data developed in this section was gathered by the author as part of a consumer survey done in four cities of Eastern Nigeria during New Year's week 1967. The methodology and elaboration is presented in the Appendix. The findings of this survey are detailed in Chapter 5.

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would eat more, if prices fell. Conversely, only eight percent ate all the eggs they wanted. Only two percent rejected eggs as a food.

Location, reflecting income differentials, also appears to be associated with egg eating habits. However, egg eating customs and taboos do not appear to be locally specific, at least in Eastern Nigeria. About 20 percent of the respondents reported they ate an egg a week. On face, a great deal of progress must be made, if this is to remain the criterion of success before the region's nutritional goal is realized.

4. Summary

There are two important markets for commercial eggs in Eastern Nigeria: Enugu and Port Harcourt. Commercial producers tend to cluster about these cities. A separate feed mill meets most of the needs of each market area. Feed is becoming a critical factor in the region due to shortage of maize which is largely imported from the Northern Region. Nearly half of the day-old chick production is produced from the MOA hatchery at Abakaliki, which, with three Nigerian-owned hatcheries sell RIR type stock. The largest private farm, Ejinaka and Thornber, produces a hybrid egg specialist chick which is now sold throughout the region.

There are at present some 350 producers having 100 or more layers. They are supported by a modest public credit program and a very

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comprehensive veterinary program which inoculates, as a free service, all day-old chicks.

Subsequent to several years of marketing difficulties on the part of producers, the government of Eastern Nigeria initiated (in 1967) an egg marketing scheme in the Enugu market area, later to be followed by a region-wide program.

Although strides have been taken in widening egg consumption, the market remains largely restricted to the well-to-do Nigerians, as a regular consumption item. Income is the principal bar to greater consumption.

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CHAPTER 4

THE PATTERN OF EGG CONSUMPTION IN URBAN EASTERN NIGERIA

"Half the world does not know
how the other half lives".

Rabelais

1. Introduction

The objective of the commercial egg project was to promote egg consumption among all income groups in urban areas. To gain some appreciation of egg consumption habits in Eastern Nigeria cities a consumer survey of four cities was undertaken during the last week of 1/ 1966. Although a cross-section survey, such as this, cannot estimate the effect on eating habits brought about by the poultry scheme, it can tell us which groups presently eat eggs, in what quantity, and how often. It can, moreover, tell us something about the consuming groups; their general consumer habits, levels of education, vocation, size of family, and diet.

1/ The details of the methodology used in this survey are outlined in the Appendix. The survey was conducted in Calabar, Enugu, Onitsha and Port Harcourt: 120 interviews being attempted in each city. The sample was designed such that half the interviews were done in low-income areas; and a quarter each in middle and high income locations.

Using the data developed in the field surveys, this chapter will attempt to indicate and account for the pattern of egg consumptions ^{2/} and identify the consumer of eggs. This information will be used later in the thesis as a benchmark on which to evaluate the egg scheme and as a basis for policy recommendations.

2. Family Income Patterns in Four Cities of Eastern Nigeria

The sample survey provided information for a representative picture of egg consumers in different income groups. The average household income found in the 'low' income sections of all cities was £ 76 (\$213), which divided among the typical household of fifteen persons represent a per capita income of £ 5:1 (\$14). Most (87%) of the respondent families claimed to have only one full-time wage earner. Urban family income is supplemented by food raised on the family farm and sent to the family members residing in the city. Urban cash income is, therefore, to an unknown extent, supplemented by subsistence activities. Family income levels (Table 4-1) have been worked out for each income group for each city studied.

^{2/} It was originally intended to use the income-consumption data to develop income elasticities. However, the computer print-out with the data and the original questionnaires were casualties of the civil war.

Table 4-1

Average Annual Family Income Among the Three
Studied Income Groups and Four Cities
Samples in Eastern Nigeria, 1966

City	Average Annual Family Income	Average Annual Income by Income Groups			Persons in Average Size House- hold	Average Annual Income Per Person in Each Income Group		
		Low	Medium	High		Low	Medium	High
		£ 0-100	£ 101-300	£ 301-700		£ 4.5	£ 19	£ 28
Calabar	£ 210	£ 68	£ 139	£ 424	15	£ 4.5	£ 19	£ 28
Enugu	243	72	194	463	15	5.0	13	31
Onitsha	230	93	180	418	15	5.5	12	28
Port Harcourt	254	72	238	452	16	4.5	15	28
All Groups	234	76	187	439	15	4.5	12.5	29

Prepared by author from a consumer survey in four cities.



It is not possible, from this survey, to estimate the proportion of the urban population which falls within each income classification. However, it seems safe to assume that the representative family in a given city would very likely fall within the low income group. The highest income group is composed of expatriates, a few very senior civil servants and the most successful (but small in number) Nigerian businessmen. The middle income group includes the civil servants with a high school education, and a number of successful traders. This group appears to be much more numerous than the high, but much smaller than the low income group. A guess would classify 80 percent of the public as low income, 15 percent as mid, and no more than 5 percent as high income families. The effect of this distribution upon the absolute market for commercial eggs must be borne in mind while considering the findings of this survey and relating these to the wider problems which confront the commercial egg project.

3. Food and Egg Consumption Patterns in Four Cities
of Eastern Nigeria

Respondents were asked whether they had consumed any of fifteen different foods 'last' week although no effort was made at this point to ascertain how much of any food was purchased or consumed or at what prices. It is very difficult to keep food in-store for long under local conditions, so it may be presumed that nearly all food purchased in a

given week is likely to be consumed immediately. The data gathered from these questions appear in Table 4-2, arranged in rows by food groups and in columns by city and average for the cities. As a benchmark the average family and per capita income for the four cities is also noted in the relevant column.

The consumer preference for, and reliance upon, the two starchy staples, yam and cassava, are immediately evident.^{3/} To these basics are added palm oil, peppers, aromatic leaves and green vegetables. Some meat (beef or goat) or fish (usually dried) complete the daily 'chop'. Cassava is not a preferred food and is readily exchanged when incomes or alternatives permit. A new staple is rice, which has become widely popular although yet comparatively scarce. It has been suggested that eventually high yielding rice will replace the tubers as the basic carbohydrate.

The relative percentiles regarding meats do not reflect preference so much as availability. Although the percentiles appear reasonably high, (53 percent reporting the purchase of beef last week) the quantities consumed per person are very small. This is equally true for fish. As we shall see egg consumption per capita falls much below what the

^{3/} Cassava is sold in root form, and resembles a very long potato. From Cassava a porridge-like food is processed called 'gari', which is a daily staple.

Table 4-2

Comparison of Consumption of Food Staples in Four Cities (Showing Percentage of Respondents in Each City Who Consume the Food at least Once a Week)

(in percentage)

Food Group	Average Household Income (from Table 4-1) in the Four Cities						
	£ 210	£ 243	£ 230	£ 254	£ 234		
	Calabar	Enugu	Onitsha	Port Harcourt	Average All Regions		
Average per capita income	£ 14	£ 16	£ 15	£ 16	£ 15		
1. Carbohydrates							
Gari	95	86	89	85	38		
Cassava	63	24	45	13	39		
Yam	35	91	90	59	69		
Rice	56	94	93	68	77		
2. Meat/Protein							
Goat	10	41	27	28	27		
Pork	9	20	20	6	14		
Beef	18	78	69	51	53		
Chicken	15	61	50	34	40		
Eggs	36	76	55	68	59		
3. Vegetables*	73	91	80	75	80		
4. Fish							
Fresh fish	51	72	54	45	56		
Stock fish	57	42	48	45	48		
5. Beverages							
Beer	19	59	20	38	35		
Liquor	11	14	9	11	11		
6. Guinea fowl eggs (during the three month season)	15	53	23	67	40		

*Average of peppers, greens and beans.

Prepared by the author from a consumer survey of four cities.

the percentile suggests. The carbohydrates are, therefore, by weight, much the most important food in the diet in these four cities.

The percentiles associated with eggs suggest that many people in all cities (except Calabar) use eggs frequently. This rate of egg usage seems to move directly with household income. Being a cross-sectional survey, it is not possible from this study to see how this rate of consumption is affected by changes in price; but it is possible to see how it varies with income and between levels of education.

A cross-sectional survey cannot give firm insights into the behavior of a group as its income varies (this requires study over time). If, however, we assume that the consuming group in Nigeria is homogeneous, and is differentiated mainly by distinctions in income, their comparative consumer behavior between income groups is suggestive (Table 4-3). Four income groups were isolated and questions asked regarding last week's consumer purchases. If we assume that the week meets the assumptions of random selection, and given our assumptions concerning perishability, then any week's purchases ought to be representative.

It was found, for example, that 9 percent fewer purchases of cassava were reported by the middle income group (£187 annually) than by the low income group (£76 annually). Cassava purchases fall further by 16 percent between the mid and high income groups; which



Table 4-3

Comparison of Consumption habits between Income Groupings and net Change
Across the Income Range Indicating Changes in Proportions between
Groups Reporting that they usually Consume a good once a Week*

Food Type	Percentile Change Between Income Groups				Net Change Over Whole Range £ 76-700+ Annual Family Income
	Low to Middle	Middle to High	High to Highest		
	£ 76-187	£ 187-439	£ 439-700+	£ 76-700+ Annual Family Income	
Gari	- 6	+ 4	- 22	- 24	
Cassava	- 9	+ 16	- 26	- 51	
Yam	+ 50	+ 16	- 21	+ 45	
Rice	+ 31	+ 5	- 11	+ 26	
Goat	+ 13	+ 18	+ 1	+ 32	
Pork	+ 5	+ 2	+ 10	+ 17	
Beef	+ 38	+ 19	+ 5	+ 62	
Chicken	+ 18	+ 22	+ 21	+ 61	
Eggs	+ 28	+ 23	+ 22	+ 73	
Average of two Vegetables	No Change	No Change	- 5	- 5	- 87
Fresh fish	+ 7	+ 17	- 7	+ 17	
Stock fish	- 7	+ 4	- 10	- 13	
Beer	+ 14	+ 22	+ 20	+ 56	
Liquor	- 4	+ 8	+ 13	+ 17	
Beans	+ 20	+ 17	- 22	+ 15	

* These income groupings are the same as developed in Table 4-1. One addition has been made, the £ 700 per year and above is included, to give an extra column. It is conceded that the presence of an expatriate group comprising, this latter classification, with their different tastes, affect the rate of use. However, it can equally be argued that higher income Nigerians tend to conform to expatriate tastes, and that this tendency combined with nutritional information which encourage use of superior foods, will reinforce this conformity.

Prepared by the author from a consumer survey in four cities.



amounts to a 25 percent decline across all the studied groups (from low income persons to higher civil servants). A further decline of 26 percent is registered when the highest income group (above £ 700) is included. Conversely, chicken purchases (a widely popular food) increased 18 percent between the low and middle income groups; 22 percent between mid to high and a further 21 percent to the highest income group; for a total 61 percent increase from lowest to highest.

Eggs scored the highest increase in purchases between income groups for all studied food foodstuffs; 73 percent across the whole range! In terms of quantity purchased; persons in the low income group purchased no more than three eggs at a time; the middle group about a half dozen and the upper group a dozen at a time. The highest group, including expatriates, bought eggs in dozens - usually two or three dozen at a time. Such persons usually have refrigerators in which to store them.

^{4/}
Egg consumption appears to be very responsive to education. As the educational level rises, from none to some part of the basic six year school, food-use conforms to a similar pattern to income changes, but to a smaller degree. The movement between none and some education

^{4/} Davis initiated a considerable egg consumption promotion campaign which stressed in print and by radio the better adult and child health, and growth potential possible through egg use.

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is, in income terms, probably a movement within the lowest income groups - say from unskilled to semi-skilled. At this level, income is clearly the greatest restriction to any change in the nutritional pattern, regardless of the nutritional knowledge available to these persons.

The use of eggs rises 43 percent over the entire range from uneducated to best educated, while the spread between income extremes is 73 percent (Table 4-4). This great difference in response elasticities is due to the use of eggs by 51 percent of the respondent in the lowest educational group but by only 14 percent in the lowest income group. In the highest income group, 87 percent report regular use of eggs whereas 94 percent of the best educated use them.

It appears, therefore, that when the movements in the consumption of foodstuffs are compared across the whole range (lowest to highest income and education), the greatest proportionate changes occur among income categories. However, with the improvement in educational levels a better balanced diet emerges - carbohydrates decline in all groups, while the consumption of fresh fish and vegetables increases.

It is important, from a policy standpoint, to decide which factor is the more influential in determining the direction of consumption patterns of eggs - income or education? The evidence indicates that

Table 4-4

Comparison of Consumption Habits Between Educational Groups Indicating
the Change in Proportion Between Group Reporting they usually
Consume a good once a Week

Percentile Changes in Food Consumption Between Selected Educational Groups				
Food Type	None - 6 years	6 - Middle		Net Change Over Whole Range (none to college level)
		School	Above	
Gari	- 4	+ 1	- 33	- 36
Cassava	- 15	- 20	- 5	- 40
Yam	+ 7	- 1	- 21	- 18
Rice	+ 11	+ 1	- 13	- 1
Goat	+ 7	+ 9	- 6	+ 10
Pork	- 3	+ 7	+ 20	+ 24
Beef	+ 8	+ 10	No Change	+ 18
Chicken	No Change	+ 2	+ 42	+ 44
Eggs	+ 10	+ 12	+ 21	+ 43
Average of two				
Vegetables	- 3	- 6	- 4	- 13
Fresh fish	- 8	- 10	+ 4	+ 6
Stock fish	- 6	- 2	- 18	- 24
Beer	No Change	+ 28	- 20	- 8
Liquor	- 4	+ 1	+ 31	+ 28
Beans	+ 12	- 1	- 19	- 8

Prepared by the author from a consumer survey in four cities.

egg consumption is more sensitive to changes in income than to changes in education - especially from none to elementary education. For persons with the least formal learning education cannot, or does not, significantly influence their long-run eating habits. It should be noted, however, that the family members who are now making consumption decisions have been away from school for some time - perhaps a decade or more. Thus nutritional information presently being widely disseminated in schools may not now have much impact - but may in the next decade as the present generation of students reaches adulthood. This term lies beyond the planning period of the poultry project, so policy-makers' attention must focus on the present decision-makers.

Consumers' habits appear to be very sensitive to increases in the level of education; to middle school and above. Income can be expected to rise for a household as its education level improves and it is reasonable to expect the two to move together. Both factors seem operative but, the higher response to increase in incomes suggests egg consumption is more limited by means, than by consumer resistance deriving from taste, nutritional ignorance, custom or taboo. For this reason short-term nutritional propaganda would seem to have only marginal effectiveness.

Such a view may be supported by the reasons given by respondents for not eating more eggs. Two questions were asked in this regard: (1) why do you not eat more eggs? (2) why do you think other people do not eat more eggs (Table 4-5 and 4-6)?

In both response groups price emerges unequivocally as the limiting factor to greater egg consumption - regardless of present income or educational group. Only seven percent of respondents stated they were eating all the eggs they wanted, while 74 percent of all groups indicated they would eat more, price permitting. To bring the point more sharply into focus it should be recalled that typical egg prices range from 3/10 (.53¢) to 4/6 (.63¢) per dozen or 3.8d. and 4.6d. per egg respectively. It would appear that the potential egg consuming public remains largely untouched; "potential" being a function of income.

A great deal of folklore exists with regard to egg consumption, or the lack of it. It is said, for example, that the acquisition by a minor of a taste for eggs may cause him to become a thief. More positively, not a few persons relate that eggs are a food that can stimulate the mind prior to mental exercise - before an examination, for example. Finally, a widespread belief is said to exist with regard to the alleged powers of eggs as an aphrodesiac. Belief can have an important bearing stimulating of discouraging egg consumption. Respondents were queried in this regard (Table 4-7).

Table 4-5

Why Respondents Said They Did Not Eat More Eggs

Classification	Reasons Given for Not Eating More Eggs					Eat All They Want
	Price Too High	Did Not Like Eggs (in percentiles)	Social/ Religious	Other		
For All Groups	74	1	-	10	7	
Onitsha	86	1	1	6	2	
Port Harcourt	73	2	1	14	-	
Enugu	67	3	-	10	20	
Calabar	72	1	-	-	12	
Low Income Group	70	2	-	11	3	
Middle Income Group	70	4	-	2	24	
Highest Income Group	72	-	-	12	6	
No Education	75	2	1	8	8	
Standard Six (or some portion)	84	-	-	6	3	
Middle School (or some portion)	67	3	-	16	5	
Above Middle School	36	3	-	36	12	
Prepared by the author from a consumer survey of four cities.						

Prepared by the author from a consumer survey of four cities.

Table 4-6

Why Respondents Said Others Do Not Like Eggs

Classification*	Why Others Do Not Consume Eggs			Others
	Price	Flavor (in percentiles)	Social/Religious	
All Groups	85	5	-	6
Onitsha	93	4	2	-
Port Harcourt	75	5	3	8
Enugu	86	4	1	4
Calabar	87	7	-	6
Low Income Group	86	7	-	7
Middle Income Group	72	12	-	-
Highest Income Group	90	6	2	2
No Education	86	6	-	4
Standard Six (or some portion)	82	5	2	5
Middle School (or some portion)	89	2	6	3
Above Middle School	69	6	6	3

* By way of clarification it should be emphasized that the percentiles represent the opinions of the relevant classification with respect to their notion of how other people behave.

Prepared by the author from a consumer survey of four cities.

Table 4-7

Why Respondents Feel Eggs Are Good For Them

Classification	Why Eggs May Benefit the Consumer					
	Health	Virility	Brain (in percentiles)	Vitamins	Strength/Energy	Growth
All Groups	42	20	9	8	10	5
Onitsha	60	23	1	-	10	-
Port Harcourt	24	8	9	19	9	20
Enugu	43	37	-	5	13	-
Calabar	43	12	25	9	7	-
Low Income Group	14	2	42	24	9	6
Middle Income Group	44	28	4	16	8	-
Highest Income Group	54	34	2	-	10	-
No Education	52	18	6	5	11	1
Standard Six (or some portion)	36	25	7	6	11	7
Middle School (or some portion)	31	16	11	15	9	16
More than Middle School	30	33	12	9	3	3
Prepared by the author from a consumer survey of four cities.						

Prepared by the author from a consumer survey of four cities.

Importantly, 65 percent expressed the view that eggs can play a valuable role in personal nutrition, health, diet and well-being. Some 20 percent of the respondents in all groups indicated a belief in the benefits of eggs upon virility. The mental benefits attributed to eggs appear to enjoy a more limited vogue - only 9 percent subscribing to them. Very few persons spontaneously mentioned the criminal implications of the egg eating habit - less than 2 percent. On the other hand, when pressed by a direct question, many acknowledged being aware of the belief but stated they did not personally accept it. One can conclude that the egg is widely accepted as a good, indeed superior, food.

Considerable variation in responses appears to exist among cities. No reason for this is immediately evident; however, differentials in education, religious affiliation, intensity of nutrition propaganda, and perhaps religion may account for some. The peculiar divergence notable in the Port Harcourt responses wherein health and vitamins appear the reverse of the pattern noted elsewhere, is especially puzzling.

Given the above casual variables influencing egg consumption; what are the levels of consumption actually attained? The rate of egg consumption in each household was obtained (Table 4-8). Of these, 15 percent of the households never use eggs; on the other hand 30 percent eat them at least once a week. The regional goal, in this context, seems remote indeed. The group which actually eats quantities of eggs cannot be viewed as the great potential market originally envisaged.

Table 4-8

Rate of Egg Consumption in Respondent Households in Four Cities

Classifications	Average All Respondents	Low Income	Mid Income	High Income	No School	Standard School	Middle School	Highest School
Never Eat Eggs	15	17	4	2	18	19	3	-
Rarely	65	66	48	72	65	66	67	31
At least once a Week	20	17	48	24	17	15	30	69

Prepared by the author from a consumer survey of four cities.

A review of the data from the perspective of the proportion of the public which currently eats an egg a week casts some light upon the success of the government in attaining their goals. Given the size of the typical household - say 15 persons - one and a half dozen eggs would have to be bought each week to feed people at the anticipated rate. What proportion of regional urban households actually buy at this rate of 18 eggs per week? The following array of data is indicative (Table 4-9).

Table 4-9

Relationship Between Income and Egg Consumption
Per Week

<u>Income Group</u>	<u>Percent</u>	<u>Typical Household Size</u>	<u>Eggs Per Person/Week</u>
Low	17	16	1.1
Middle	44	13	1.4
High	24	7	2.6

Table 4-10

Relationship Between Education and Egg Consumption
Per Week

<u>Educational Group</u>	<u>Percent</u>	<u>Typical Household Size</u>	<u>Eggs Per Person/Week</u>
None	17	16	1
Up to standard 6	15	13	1
Middle school	30	16	1
More than middle school	69	16	1

The above tables were prepared by the author from a consumer survey in four cities.

Two points emerge. As income increases, consumers consume more eggs and as education increases more persons consume at least one egg. Thus higher income groups get more eggs per person while using them at a lower rate because of their smaller household size. The better educated make a greater effort to use eggs - hence the fact that 69 percent of the best educated eat a weekly egg - even with a substantial household to feed. The very high rate of use found in the top education group may be biased upward by the very extensive use of expatriates who swell the composition of the classification.

In Port Harcourt, the city with the highest capita income, consumers appear to be best-off with regards to their egg intake (Table 4-11), while Enugu performs better than Onitsha, implying that the highest level of education, and perhaps larger expatriate consuming group, affect the latter's somewhat higher average income level.

These urban figures suggest that on the average, in these four cities, only 11 percent of the consuming public eats an egg a week. The figures also show why Port Harcourt remains the best market for eggs, followed by Enugu.

4. Characteristics of Egg Consumers

Consumers buy their eggs most often at local open markets, though a significant departure from this pattern was noted in Onitsha (Table 4-12).

Table 4-11

How Often Do Respondents Buy Eggs?

Classification	Never	Rarely (in percentiles)	At least once a Month	At least once a Week
All Groups	5	15	26	51
Calabar	10	21	17	50
Enugu	1	5	30	62
Onitsha	3	8	29	61
Port Harcourt	8	28	29	30
Low Income Group	8	28	27	29
Mid Income Group	-	4	4	92
High Income Group	2	-	10	84
No Education	8	19	24	44
Standard Six	5	13	30	50
Middle School	-	3	32	64
Highest Education	-	3	57	36

Prepared by the author from a consumer survey of four cities.



Table 4-12

Where Do Respondents Usually Buy Eggs?

Classification	(in percentiles)			
	Local Hawker	Local Market	Cold Store	Direct From Farm Other
All Groups	9	64	9	5 4
Onitsha	3	7	72	5 6
Port Harcourt	26	60	6	4 -
Enugu	4	58	9	14 11
Calabar	-	65	14	1 -
Low Income Group	10	-	66	11 3
Mid Income Group	4	16	32	20 28
High Income Group	12	70	4	4 6
No Education	4	68	6	5 3
Standard Six	12	68	4	4 4
Middle School	25	50	8	11 6
Highest Education	15	27	39	6 9

Prepared by the author from a consumer survey of four cities.

The cold store (modern food store with cold chests) appears to have small impact yet with the representative consumer except in Onitsha, where they apparently are well established. The very great use made by the lower income group of cold stores seem suspicious; but the high income groups also report very great use of the local market! Unfortunately the enumerators did not probe into this rather unexpected pattern. Itinerant hawkers play little role in egg distribution except in Port Harcourt, but small Nigerian-owned cold stores such as NIBO's (Enugu) seem to be playing an increasing role in the retail segment.

Home-produced eggs figures not at all in household diet. Indeed 95 percent of the households interviewed claimed not to possess home flocks.

Consumers prefer to buy smaller rather than larger lots of eggs from their dealers. On the average nearly 40 percent buy less than a dozen at a time; a half dozen being the preferred lot). Only 12 percent bought in lots greater than a dozen. Some 14 percent either never bought eggs or were not sure what lots they usually purchased. Fully 37 percent had purchased a dozen last time while only 11 percent bought more than a dozen. Most groups studied followed this pattern of small lot purchases, a phenomenon in part explained by the lack of suitable household storage facilities for perishable eggs.

Meal times are the most popular times to consume eggs; some 71 percent of the respondents reporting this preference. A considerable number also eat them at "hotels" - or taverns. Eggs in all cases tend to be used either hard-boiled or as ingredients in other dishes. This practice seems to be a function of available cooking equipment. Frying pans are not widely used hence eggs must be cooked in pots, being boiled separately or added to the ubiquitous stew-type chop. Such cooking is normally performed over a wood fire on a hearth.

During the annual Guinea fowl egg season a considerable body of consumers make use of the cheap (2 d. each or 2/- (.28¢) a dozen) and tasty substitute (Table 4-13). In Onitsha, a town closely involved in trade coming from the north, 50 percent of the respondents have consumed these eggs. The claim is made that Guinea fowl eggs contribute powerfully to marketing problems of chicken eggs during the wet season months. Yet on the average 32 percent of the respondents eat Guinea fowl eggs during the year, lower than might be expected given their very low price. The above figures suggest that the effect in general is not so serious as one might believe outside of Onitsha.

One important question, however, emerges from the marketing of Guinea fowl eggs. Once their price falls to about 2/- (.28¢) a dozen their market appears to widen immensely. This may be a straw-in-the-wind as to the levels which commercial eggs need fall if they are to become an important item in urban diets.

Table 4-13

Consumption of Guinea Fowl Eggs

Eat Guinea Fowl Eggs	All Groups	Calabar	Enugu	Onitsha	Port Harcourt	Income			Education		
						Low	Middle	High	None	Six	Middle Highest
					(in percentiles)						
No	67	73	79	44	68	75	76	70	66	68	78
Yes	32	25	21	56	30	25	24	30	33	32	18

Prepared by the author from a consumer survey of four cities.

Respondents appeared very undecided and unclear when asked to give their own criteria for a good egg. A large number (44 percent) reported that the egg they were presently using was quite satisfactory. Some (11 percent) indicated a preference for a white shell egg, whereas only 12 percent mentioned a preference for the brown. Any egg not obviously fertile or rotten was good enough for 11 percent. No clear consensus existed among 90 percent of the respondents with regard to what constituted a good egg. For the 10 percent who did have views, consumers appear to favor a fresh egg with a very yellow yolk in a white shell. A very large role can still be played in this regard by the image-makers.

5. Summary

The consumer survey conducted in four cities of Eastern Nigeria in December 1966 provides sufficient information on the consumer and consumption habits to allow certain generalizations to be made.

The rate and level of egg consumption seems positively related to household income and levels of education. Income is a function of education to some considerable, but unspecified degree. In Eastern Nigeria many persons of quite humble formal education have nonetheless achieved considerable income, for example, in trade and transport. However, the evidence suggests that the family with higher education will be more likely to buy a more nutritious diet than the less well educated

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even though the former may have a somewhat superior income. People with higher educations, and a given income will buy more eggs than less educated people with the same income.

Several indications of the level of egg consumption presently attained have emerged from the survey.

- i. Nineteen percent of the respondents sampled eat at least an egg a week.
- ii. Five percent said they never ate eggs.
- iii. Sixty-five percent occasionally eat eggs.
- iv. Only eight percent eat all the eggs they want.
- v. Seventy-four percent said they personally would use more eggs if the prices fall.
- vi. Two percent said they rejected eggs as a food.
- vii. Ten percent did not eat eggs for unspecified social reasons.
- viii. Ninety-three percent felt eggs were beneficial as a food.

These indicators strongly suggest that eggs are an acceptable, even superior food. The most serious barrier to greater use in price, given the level of income in urban Eastern Nigeria. Though egg prices have fallen 50 percent since 1961, this decline has mainly affected the higher income and best educated. The vast bulk of the urban public remains largely beyond the reach of the egg producer, because prices are more

than incomes can bear. Clearly as egg prices fall the quantity demanded will increase; but to reach the broad market desired (and the objective set by government namely one egg per person per week) will require a very substantial price reduction.

CHAPTER 5

THE COMMERCIAL POULTRYMAN - A STUDY OF ENTREPRENEURSHIP

"There are always and everywhere potential surpluses available. What counts is the institutional means of bringing them to life... and for calling forth the special effort, setting aside the extra amount, devising the surplus". 1/

1. Introduction

Before turning to a detailed analysis of the commercial poultryman as a manager and decision-maker it will be useful to consider him in his wider context as an entrepreneur. Such an evaluation will give new insight into the farmer; adding a better understanding of the farmer's own view of his problems and in this way obtain some feeling whether poor management is due to other considerations than economic optimization (which perhaps are of equal importance to him), perverse economic behavior, poor business training, poor information - or some combination among these. Such information can have an important role to play when designing policy guidelines.

1/ Polanyi, K.; editor; Trade and Markets in the Early Empires, Macmillan, 1957, Page 339.

2/ Entrepreneurship is defined as the skill, desire and ability to enter a business. Management, on the other hand, has to do with the operation of the firm once the investment has been made by the entrepreneur.

This chapter will bring together a number of different characteristics associated with, or attributed to, poultry entrepreneurs to produce a general statement about them. In addition, some attempt will be made to account for the variable successes these entrepreneurs have had in the poultry business and to relate these to their essential entrepreneurial characteristics. The material introduced below was gathered in a cross-sectional survey of 100 producers.^{3/}

2. Planned Role of Entrepreneurship

The indigenous entrepreneur has played an important role in the growth of the commercial egg industry. At present, private persons own and operate virtually all the producing firms in Eastern Nigeria. The regional government has relied upon the motive of personal gain whetted by public promotion of the industry and the subsidized provision of inputs, to attract new producers. The government assumed that it need only provide the proper incentives and business climate to spur and nurture the new business to maturity. There were excellent grounds for supporting this optimistic view regarding popular response to public initiative.

^{3/} The details of the methodology used to gather the information used in this section may be found in the appendix. In Chapter 6, costs of production will be presented for the representative farm - being the average cost of production from those studied in a five month record keeping study - and for the best one-third of producers. The above section is intended to give the reader a picture of the producer associated with the firm examined in the following unit.

The dominant ethnic groups of Eastern Nigeria, the Ibo and Ibibio, are opportunity-oriented. Although much of their activity is of the zero-sum sort (exchange rather than productive activities), Easterners are, as a group, remarkably open to new ways of earning money and, in fact, derive prestige and status from business success. Kilby reports, that Easterners have been forced to seek productive occupations ^{4/} unconnected with land because of the great pressure on the land. Further, he says, Ibo social structure permits, indeed stressed, alternative choices and goals, individual initiative and recognition of achievement. Such social and economic factors explain, in part, the considerable response to public incentives to enter the commercial egg industry. It does not, however, explain why many of these producers operate unprofitable farms. Such inefficiency in the egg production segment of the poultry industry appears to be inversely related to the quality of management and has two important implications. First, it adversely affects the rate of capital formation. Second, it may affect the formation of an entrepreneurial class. Business failure deriving from poor performance may deter these persons, and others, from entering positive-sum ventures in the future.

The apparent poor quality of much of the management observed on poultry farms is relevant to the development of a Nigerian entrepreneurial

^{4/} Kilby, P., African Enterprise: The Nigerian Bread Industry, Stanford University, Hoover Institute, 1965, Chapter 8.

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class. Entrepreneurship and management loom as critical bottlenecks in many development schemes in Nigeria. Little empirical research on entrepreneurship has been done in Nigeria, but the poultry industry's experience may be of significance in identifying some of the questions, answers, issues and problems.

3. Portrait of Two Poultrymen

To obtain pertinent information regarding the character of poultry entrepreneurs, interviews were conducted with 100 active poultrymen and 12 former ones. From this study, two composite poultrymen can be synthesized. One represents the modal (or representative) poultryman, and the other those producers who fall into the best-one-third category (which will be developed in Chapter 6).

The modal poultryman is about 37 years of age and lives at his farm site much of the time. His family is either from Onitsha or Owerri Province. He has eight years of school; making him one of the better educated members of the community. He is a functional literate, and can speak quite acceptable English. Prior to entering the poultry industry, in 1962, he had been a skilled worker (although he might equally have been a junior civil servant or artisan). He reads a newspaper and has a radio. His house is of cement block, with a metal roof. Indeed, his compound has many of the trappings associated with a reasonably successful person. His children are in school. He

takes great pride in talking of his future plans with regard to his most promising son's education - college - perhaps overseas.

He drifted into poultry mainly to supplement his income but also to make use of considerable personal savings. He has had a long-standing interest in poultry rearing as a hobby. In 1962, he heard of the government's commercial egg scheme from several sources; but he relied most of all on information from his family and friends. He may have heard Davis speak and, if he lives in Abakaliki Province, likely knew Davis personally.

Having learned about the investment possibilities in poultry, he waited nine months to make the final decision to enter production. He relied primarily upon personal savings supplemented by some family money to obtain the initial capital. The family farm became the site of his poultry operation. He knew little factually about poultry husbandry and did not personally bother to attend one of the several training programs open to him, but he did hire a 'manager' whom he sent to such a program. He has never attended a poultry conference and has rarely been in contact with his extension worker, whose name he does not know.

Once in business, lack of money to meet current operating expenses became a persistent problem. He had already invested most of his liquid assets in his poultry house, the plans for which he obtained from the government. His present fixed assets in housing, equipment and two

mature laying flocks (MOA-RIR) of 200 layers each; is nearly £ 500 ^{5/} (\$1400). He has already experienced feed shortages, occasionally a scarcity of chicks, and sometimes has had difficulty obtaining veterinary assistance when needed. A reliable market for his eggs has remained elusive.

His knowledge of business management is somewhat more rudimentary than that of husbandry. He has little understanding of costs other than as out-of-pocket expenses. A grossly exaggerated notion of the longevity of his poultry house blurs his very unclear ideas regarding fixed costs and depreciation. He is aware that costs and incomes exist as separate but related entities, but tends to think of them as a single point in time rather than as a process. He clearly understands that revenue minus cost is profit. But he tends to see profit as money in the pocket rather than as a residual after several cost deductions. Part of his problem stems from little knowledge of book-keeping.

He keeps records. But these are in reality lists of numbers: number of hens, chicks and mortality, bags of feed bought, revenue from eggs sold. However, these figures are kept as aggregate for all flocks and he has, consequently, little notion of the flock as a productive enterprise having a separate entity distinct from other flocks. Not

^{5/} This is \$1.75 per hen housed. As one flock ages, he will bring in a grower flock so that for 10-15 weeks he will have three flocks on litter, but only two producing eggs.

keeping records on a per-flock basis, he cannot begin to maintain meaningful guides to decision-making.

At present he gets very little income from the business although he looks upon it as his "most important activity" - a function no doubt of the size of his investment in it. His staff is not as reliable as he would like but he does not really know how to get more out of them. He presently hires two men and uses one or two additional family members. His ability as a supervisor is limited both by his lack of knowledge about husbandry, and his ignorance of actual flock performance. Hence, he uses hit or miss methods. He keeps old or non-productive flocks too long. He buys cheaper breeds rather than quality stock. He provides adequate feed (and in fact sometimes in wasteful excess) but he often fails to see that troughs are properly filled, drinkers full and feeders upright.

Since the marketing scheme began, he has been less concerned about outlets for his eggs, but he is still worried whether the scheme will do all its promoters say it will. He would like the scheme to buy all his culls and eggs. He would like cheaper feeds. He does not much care about egg consumption programs or an improved extension service. He has mixed feelings about the business and feels it has been a financial disappointment, however, he intends to stay in it.

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The owner included with the most efficient third, differs more in degree than in kind from his more typical colleague. He is likely to be slightly older, lives at his farm site, has ambitious for his children, and possesses a certain level of material well-being. He has, however, somewhat less formal schooling and probably does not have a standard six certificate; nonetheless, he can read and understand English. Importantly, he has been either the owner of a business, or a shoe or cloth merchant. He was apprenticed to his trade at an early age and eventually received an endowment from his master which allowed him to start a similar business of his own. He learned to keep business records. He was a success in this business, and was able to lay aside considerable savings from it. He likely has had long-standing interest in husbandry, and when he learned of the introduction of a commercial egg industry, he felt that this was an opportunity to invest his savings in an industry of some interest to him.

He learned of the industry from persons whose views he respected and whose judgement he trusted, rather than from public media. He entered commercial poultry in 1962 using personal savings. At present he gains about half of his income from poultry and owns assets of up to £1000 (\$2800). Poultry production is his most important work. He has nearly 1500 hens plus some 500 chicks. He has used MOA-RIR but is moving to hybrids. He has already had WL or Thornber 404 hybrids. His chicks are all hybrid.

He learned poultry husbandry from a training course taken at one of the government stations, but he also hires a trained manager. He uses a slightly larger than average staff, but supervises them better. He uses the extension service; especially if he lives near Abakaliki.

He does not keep per flock records but has expressed interest in them. His knowledge of costs are not much better developed than the typical poultryman; but he keeps close tabs on waste, and purchases egg specialist breeds which have to some extent offset his lack of close control.

He is better located than the average poultryman, typically near an urban area though not necessarily a large consuming market. He uses family land for his farm.

He is worried about the future of the industry. He would like to see marketing improvements and stable egg prices. But on the average he feels that he will be able to survive. He is glad he entered poultry and plans to remain. However, he has made some investments in other enterprises, and may keep a finger in his old business.

Two major distinctions appear between the two groups of poultrymen: education and previous experience. These are really one, however, if a man is regarded as the sum of his experience (including formal and informal, or experimental, education). The average poultryman tends to have more of the formal whereas the superior has had more practical experience in trade, having foregone several years of schooling.

The relatively superior performance of the less well-educated group calls for some explanation. It is postulated that a rather neutral relationship exists between formal education and business success. The better businessmen are traders who typically have lower educational levels. Those with higher education are typically professional or civil servants with little practical business experience. Perhaps entrepreneurship as an art - form is not greatly affected by education but can be honed by seven to eight years trading experience. Moreover, the type of education offered in Eastern Nigeria does not seem to prepare one for business activity.

4. Characteristics of Poultrymen

Let us turn to a more detailed examination of the distribution of the responses to the questions from which the two composite poultrymen have been evolved.

The average age of poultrymen interviewed was 37, with as many thirty and under as over forty (Table 5-1).

The commercial egg program was introduced in 1961-62 and most of the poultrymen reported (Table 5-2) entering the business since that date, especially in 1963. But a surprising 21 percent claimed to have had poultry enterprises prior to this time - some since 1946. The presence of this group before the formal advent of the program

Table 5-1

Distribution of Ages of Studied Poultrymen on
100 Farms of Eastern Nigeria

Age	Less than 20	21-30	31-40	41-50	51-60	61-70	More than 70
Number in Age Group	1	30	39	18	8	3	1

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Table 5-2

Proportion of Poultrymen Entering the Industry in
Selected Years

Year of Entry	Percent of Total Entering that Year	Percent Cumulative
1965	14	100
1964	16	86
1963	28	70
1962	21	42
1961	5	21
1960	8	16
1959	1	8
1958	2	7
Prior to 1958	5	5

Compiled by the author from the survey of 100 farmers, June-July, 1966.

testifies to the autonomous existence of conditions in which the industry could grow, and the willingness of Easterners to invest even before government led the way. These poultrymen were the recipients of the improved RIR distributed from various government stations over the 1950's, plus an unknown number of private imported birds. Similarly, their success in establishing production no doubt encouraged the MOA to push ahead with the project.

The surge after 1961 testifies to the sharp upturn in interest registered after Davis and the MOA stepped up promotional activities and interested entrepreneurs in the possibilities open to them in commercial egg production.

The rate of entry begins to decline sharply, after 1963. This close correlation between new entry and the success of the industry is testimony of the degree of sensitivity to the market felt by would-be Eastern entrepreneurs.

Poultrymen report a variety of reasons for entering the industry, and expressed their most important and second most important reason for starting a poultry farm (Table 5-3). The chance to earn extra money appears to be the most important factor inducing participation. Yet, many people seem to have selected poultry for reasons not altogether economic; mainly familiarity with, or an interest in, poultry husbandry. Prestige may have been a factor too.

the first of these is the fact that the system is not a simple one, but a complex one, in which the various parts are interrelated and interdependent. The second is that the system is not a static one, but a dynamic one, in which the parts are constantly changing and evolving. The third is that the system is not a closed one, but an open one, in which the parts are constantly interacting with the environment. The fourth is that the system is not a linear one, but a non-linear one, in which the parts are constantly interacting with each other in a non-linear fashion. The fifth is that the system is not a deterministic one, but a probabilistic one, in which the parts are constantly interacting with each other in a probabilistic fashion. The sixth is that the system is not a simple one, but a complex one, in which the parts are interrelated and interdependent. The seventh is that the system is not a static one, but a dynamic one, in which the parts are constantly changing and evolving. The eighth is that the system is not a closed one, but an open one, in which the parts are constantly interacting with the environment. The ninth is that the system is not a linear one, but a non-linear one, in which the parts are constantly interacting with each other in a non-linear fashion. The tenth is that the system is not a deterministic one, but a probabilistic one, in which the parts are constantly interacting with each other in a probabilistic fashion.

Table 5-3

Reasons for Entering Commercial Egg Production
Given by 100 Farmers

Reason Given	As First Choice (percent)	As Second Choice (percent)
Income supplement	46.9	11.3
Good investment opportunity	21.4	26.5
Independent work	8.2	3.7
Hobby	8.2	35.5
Otherwise unemployed	7.2	5.6
Pension supplement	4.8	7.5
Provide eggs for home consumption	2.4	5.6
Because of government promised help	1.0	1.8
Lacked land for any alternative	1.0	1.8
Total	100.0	100.0

Compiled by the author from the survey of 100 farmers, June-July, 1966.

To determine the consistency and reliability of answers to sensitive questions, respondents were asked the following questions: (1) What proportion of your total income accrues at present from your poultry enterprise, and (2) Yes or No - do you consider poultry to be your most important source of income? About 60 percent of respondents reported that their poultry enterprise at present is their most important source of income. The distribution of responses appear in Table 5-4 and 5-5.. The array of data on Table 5-5 was subjected to chi-square analysis to ascertain if respondents had in fact been consistent in their answers. The test yielded a computed value for chi-square so high (.005) that a hypothesis presuming a non-relationship between the variables must be rejected and the inference made that the proportion of income received by entrepreneurs from their poultry firms is highly related to their commitment to the industry as their primary source of livelihood. The seeming consistency of responses to such sensitive questions would appear to auger well for the reliability of responses in general.

Table 5-4 and 5-5 indicates, however, that poultry provides the "major" source of their livelihood for only a few families and that only nineteen percent receive three-quarters or more of their total cash incomes from their flocks. About half of the respondents received little or no income from their poultry flocks. To gain some insight

Table 5-4

Proportion of Total Income Accruing to 100 Poultrymen
from their Commercial Egg
Enterprises

Proportion of Total Income	Percent Earning this Proportion	Percent Cumulative
Almost All	12	100
3/4	8	88
1/2	10	80
1/4	20	70
Almost None	50	50

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Table 5-5

The Relationship between Persons who feel that the Poultry is (or is not) their Most Important Work and the Proportion of their total Income Deriving from it

Commitment to Poultry Business	Proportion of Income from Sale of Eggs					Total Number of enterprises in each Group
	Almost All	3/4	1/2	1/4	Almost None	
Is this your Most Important Work?	11	8	6	10	28	61
Is not your Most Important Work?	-	-	3	12	24	39
Total	11	8	9	22	52	100

Compiled by the author from the survey of 100 farmers, June-July, 1966.

into this matter, the vocational groups into which each class falls were examined. Respondents were asked: what other forms of livelihood do you at presently engage in? Table 5-6 shows that twenty-three percent of the farmers interviewed have no alternative work to their poultry; 10 percent being persons who consider themselves primarily as poultrymen. Who are these people who claim poultry as their most important business, yet, receive virtually no income from it?

These respondents seem to fall into three groups. The first group possessed, at the time of the interview, only grower flocks from whom no income was currently being derived. In the respondents mind (and in fact) poultry was likely the main line of work even if little or no income was currently being realized from it. Clearly, once production began and followed its normal course, the respondents' earnings would increase.

The second group was composed exclusively of businessmen; traders, contractors, etc. These respondents may have been reluctant to admit for one reason or another, the relative importance of their activities. But this group represented a small (8 percent) proportion of the total sample.

A final group may have arisen on semantic grounds owing to difficulties arising in translation (or concept) between enumerator and

Table 5-6

Types of off-farm-work held by studied Poultrymen;
showing Distribution Between Farmers who did or
did not consider Poultry as their most
Important Occupation

Is Poultry your Most Important Occupation	Alternative Occupations of Poultrymen					No Alter- native	Total	
	Farmer	Teacher	Business	Trader	Profes- sional			Govt.
1/ Yes	21	6	10	3	-	2	19	61
1/ No	7	10	9	6	2	1	4	39
2/ Total	28	16	19	9	2	3	23	100

1/ Expressed as raw numbers.

2/ Expressed as percentage.

Compiled by the author from the survey of 100 farmers, June-July, 1966.

respondent. For example, the word 'important' may have been an unhappy choice to describe the enterprise producing the respondent's most significant source of income. Although this eventuality was foreseen, and enumerators coached on the intent of the question, some ambiguity may have lingered and the concept blurred when it finally reached the respondent. Thus the word 'important' may have taken on a meaning of significance in non-money terms. Given the great publicity surrounding the project, some respondents may have seen poultry in status terms, transcending a simple source of income.

Four respondents gave 'pension supplement' as an incentive to enter poultry. For such persons, poultry could take on the trappings of hobby or present most important work.

Poultrymen have brought to the industry with them a quite wide range of vocational experiences and trade and commercial experiences have played a large role in fashioning future poultry entrepreneurs (Table 5-7).

Respondents were asked about the number of vocational experiences in their working lives (Table 5-8) and a broad range appear; commerce, teaching, skilled labor, clerks, artisans and government workers. Clearly poultry entrepreneurs are not drawn from true farmers or a purely rural population or from any other group, exclusively. Some 55 percent appear to be associated with essentially urban activities. It is

Table 5-7

Distribution of Vocational Background of Poultrymen,
Reported by Province

Province	Farmer	Profes- sional*	Teacher	Trader	Self- emp.	Govt.	Skilled	Un- skilled	Other**	Total
Abakaliki	4	-	3	7	3	2	5	-	-	24
Annang	1	-	2	-	-	-	1	-	-	4
Enugu	-	1	4	4	2	3	4	1	-	19
Onitsha	3	-	2	9	1	7	8	1	2	33
Owerri	3	-	9	3	1	2	6	-	-	24
Port Harcourt	1	1	2	1	2	5	6	-	1	19
Umuahia	3	1	4	9	2	3	7	1	-	30
Uyo	1	-	3	1	-	1	1	-	-	7
Total	16	2	29	34	11	23	38	3	3	160

* Clergy, medical or legal.

** Other; 1 politician, 2 house-wives
(Onitsha)

Compiles by the author from the survey of 100 farmers, June-July, 1966.

Table 5-8

Vocational Experiences Over the Working Lives of
100 Poultrymen

Vocation	Number of Jobs Reported	Percent of Total Jobs
Skilled worker	38	24
Trader	34	21
Teacher	29	18
Government	23	15
Farmer	16	10
Self-employed	11	7
Unskilled labor	3	2
Professional	2	1
Housewife	2	1
Politician	1	.05
Evangelist	1	.05
Total	160	100

Compiled by the author from the survey of 100 farmers, June-July, 1966.

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likely they are first generation city dwellers who have saved money and are now using it on the family farm to supplement urban-based incomes. Such persons would also be those most knowledgeable about new activities and most familiar with the ways to learn about new opportunities. The remaining 45 percent live permanently at farm sites, but often engage in commercial farm activities; pineapple, palm oil, rubber or cash cropping of staples. Only 10 percent of the sample have had no off-farm vocational experience; indicating that most of the 45 percent presently on the land also have learned to look to urban areas for economic opportunity and have worked in non-farm activities.

The figures in Table 5-8 represent all the 160 jobs of which the 100 respondents have held at some time in their lives. The largest group skilled workers - embraces clerks, seamstresses, tailors, blacksmiths, drivers, overseers, carpenters and so on. The government classification includes jobs on the public payroll, such as school administrators, police, produce inspectors, bureaucrats and the like. The self-employed group counts contractors and motor vehicle owners. In addition to the 160 jobs reported by the 100 respondents, only six prolonged periods of unemployment were reported.

Persons involved in business activities such as trade, self-employed businessmen and the professions (a lawyer and a doctor) represent nearly 30 percent of the total job experiences. This would seem to be the best

educated group so far as entrepreneurship is concerned, since their work required them to become familiar with at least rudimentary concepts of book-keeping and business practices in general (Table 5-9).

When a chi-square test is applied to poultrymen who keep records on a per flock basis, a high degree of relationship was found to exist (13.42) between keeping proper records and vocational experience. The implication is that potential quality of management ought to be related to the type of vocational experiences entrepreneurs have had.

When levels of education achieved by poultry entrepreneurs are added to the range of skills represented in the industry it becomes evident that the poultry industry includes a considerably above-average group of people for Eastern Nigeria. Poultrymen have an average of eight years of school. Four respondents had no education and only 15 failed to reach the level of elementary six. About 45 have had some middle school. Five poultrymen have attended college; three of whom completed their degrees (Table 5-10).

Few poultrymen come from vocational backgrounds that require little or no education, a point brought out by the presence of only three unskilled workers in the group. Even farmers, a normally less-educated group, had attained surprising levels of schooling. Over half of the persons classified as farmers at the time of interview had finished eight

Table 5-9

Vocational Background of Poultrymen Keeping Records
on a Per-flock Basis

Do you keep business records for your enterprise?	Most Important Vocational Background of Poultrymen				
	Teacher	Government	Professional	Trader	Other Total
1/ Yes	8	9	1	14	3 35
1/ No	21	11	2	27	4 65
2/ Total	29	20	3	41	7 100

1/ Expressed as raw numbers.

2/ Expressed as percentage

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Table 5-10

Educational Backgrounds of 100 Poultry Entrepreneurs

Level of Education (Years)	Percent in Each Group	Cumulative
0	4	4
1	0	4
2	1	5
3	3	8
4	4	12
5	3	15
6	4	19
7	10	29
8	35	64
9	4	68
10	9	77
11	3	80
12	15	95
More than 12	5	100

Compiled by the author from the survey of 100 farmers, June-July, 1966.

years of school (16 of the 28). Four had completed twelve years of formal education.^{6/}

Respondents were asked about the manner in which they had first learned of commercial poultry. They were asked to give the first and second most important source of information (Table 5-11).

Respondents rely primarily upon known and trusted persons as sources of information (48 percent). Even those who rely primarily upon some other source of primary information - radio, personal witness, newspapers, or in school - sought corroboration by friends and family. Personal observation at other farms, the regional poultry center or at schools accounts for nearly 20 percent of primary information. The MOA either through the extension service or through the information service provided for another 18 percent.

Radio, available in many homes, plays a modest role as a source of primary information. However, once the respondents were alerted to the possibilities of an investment in poultry by a valued personal source, the public media - radio and newspaper - seems to play a strong supporting, and possibly decisive, role in supporting an idea received from a normally respected source.

^{6/} The distribution of education among 28 full-time farmers who were also poultrymen are: one, no school; four, standard six or less; sixteen, eight years; six more than eight years. None had attended college. The poorest educational groups are in Abakaliki Province, the highest in Onitsha.

Table 5-11

Source of Information used by Poultrymen in Learning
of the Poultry Business

Source	Most Important (percent)	Second Most Important (percent)
Friends (including family)	48.4	4
From MOA information	12.3	-
Observed private farms	10.0	21
Public address	8.2	21
Newspapers	6.1	28
From extension service	6.0	4
Visited Regional Poultry Farm	3.0	9
Grew up on a poultry farm	3.0	1
At school as a student	2.0	4
Radio	1.0	9
Total	100.0	100

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Having once learned of the poultry business, poultrymen entered into it at varying lags in time. One-third of the respondents waited more than a year before actually entering the business. A second third acted within six months of first learning about the possibilities in commercial poultry. This response lag is shown in Table 5-12.

Clearly the most important barrier to entry into the poultry business is lack of money (Table 5-13). The timing of entry into the business also determined to some extent the type of difficulties encountered. Thus a person entering during the maize shortage of 1966 would likely have seen the lack of ration as a most serious entry problem. A person entering in 1963-64 would have experienced great difficulty obtaining chicks. In the early years (or even recently in the remoter areas) anxiety about the availability of veterinary services might have been a barrier.

The lack of market outlets and experiences in the business appears to be a perennial problem. Of all inputs, land clearly emerges as the least important limitation to entry. What may be a limiting factor, but does not appear, is the problem of obtaining land where the poultryman wants it, as opposed to where he can. The remarkably unsuitable location of some sites with respect of feed sources and/or market outlets may derive in part from such difficulties.

Respondents were asked about the sources of finance for their poultry enterprise; two answers were solicited - most important and second most

Table 5-12

Entry Lag Reported by 100 Poultry Entrepreneurs
After first learning of the Opportunities in
the Industry

Time Lag from first Information on the Industry	Percent in Each Group (percent)	Cumulative (percent)
A month	11.5	11.5
Three months	12.0	23.5
Six months	15.0	38.5
Nine months	4.5	43.0
One year	24.0	67.0
More than a year	33.0	100.0

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Table 5-13

Problems of Entry into the Poultry Business Reported
by 100 Producers

Reported Problems of Entry	Most Important	Second Most Important
Lack of money	47.4	7.5
Lack of experience	18.6	9.4
Lack of feed	12.4	30.2
Lack of market information	7.2	9.5
Lack of veterinary help	6.1	22.3
Lack of chicks	5.1	13.8
Getting land for site	2.1	5.6
Other	1.1	1.7
Total	100.0	100.0

Compiled by the author from the survey of 100 farmers, June-July, 1966.

(Table 5-14). Personal savings, supplemented by a loan, emerges as the typical source of entry funds. The high equity demands by FAID, and the very few alternative sources of loans, make loans a poor first source of money. Family funds are equal in importance to direct loans.

Those persons who had obtained loans were asked about the source of the loans (Table 5-15). Banks appear to be a poor source of loans, as few can meet the equity or other requirements; thus government ^{7/} institutions must bear the burden. Loans from formal institutions, of all types, represent half of the loans reported. Some 39 percent of the respondents reported having difficulty in obtaining a loan. Difficulties reported in descending order of frequency were: (1) could not meet minimum requirements; (2) did not get cooperation from officials (from the respondents' point of view!); (3) lack of personal influence. Even so, 37.5 percent of the loans granted, come from the government.

Two avenues are open for poultrymen to prepare themselves as owner-operators of their poultry farms: either train themselves or prepare a manager in their stead (Table 5-16 and 5-17). In fact only 28 percent of the owners have taken training at Abakaliki, or elsewhere. Although 28 percent is a disappointingly low level of owner-training, it must be remembered that it may be offset, to some extent, by practical business

^{7/} Enumerators on several occasions reported that poultrymen had erected over-large poultry houses to act as equity for loans which were not necessarily used for the poultry enterprise.

Table 5-14

Sources of Finance for 100 Enterprises Used
to Enter the Poultry Industry

Source of Finance	Most Important (percent)	Second Most Important (percent)
Savings	73.6	51.8
Family	15.7	14.8
Loan	3.2	25.9
From partners	3.1	-
Personal income (including pension)	2.2	3.7
From cooperative society	2.2	-
Friends	-	3.7
Total	100.0	100.0

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Table 5-15

Sources of Loans Reported by Poultrymen

Source of Loan	Proportion Using the Source (percent)
Government Agency	37.5
Friends	30.5
Bank	13.0
Cooperative Society	12.5
Family	7.5
Total	100.0

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Table 5-16

Proportion of 28 Owners who Participated in Different
Training Programs in Eastern Nigeria
and Elsewhere

Location of Training Program	Percent Attending
Other Centers in Eastern Nigeria	50
Abakaliki	17
Self-trained (correspondence course)	14
Apprenticeship	8
Overseas (Israel, United Kingdom)	7
From Extension Service	4
Total	100

Compiled by the author from the survey of 100 farmers, June-July, 1966.

experience, though such background is no substitute for detailed technical knowledge. However, 69 percent of the farms have hired managers who have had some sort of training, half of them at Abakaliki, and another third at other training centers in Eastern Nigeria (Table 5-17).

The term "manager" is in a number of instances an eloquent title dignifying a misnomer. Often they are virtually illiterate persons who have little interest in their work. Between trained owners and trained managers, over 70 percent of the enterprises had some level of special training. However, the training is not reflected in work patterns on many premises; exemplified by empty water troughs, upset or empty feeders, spilled feed and so forth. They are not, however, underpaid. Hired staff appear to be paid a wage competitive to off-farm opportunities and there is a low rate of turn-over among employees. (During the studied five month period, on 21 farms, not a single person was dismissed, while some were added!) Many of these hired persons live at the poultry site seven days a week. But what is accomplished during this period is open to question.

On 28 percent of the farms interviewed neither owner nor manager had any training in poultry management, and on only 9 percent of the farms were both owner and manager trained. It must be noted, however, that a few of the non-formally trained owners had made individual efforts

Table 5-17

Proportion of 68 Managers who Participated in Various
Training Programs

Location of Training Program	Percent Attending
Abakaliki	49
Other Centers in Eastern Nigeria	34
Apprenticeship	9
Overseas	6
Centers in Western Nigeria	2
Total	100

Compiled by the author from the survey of 100 farms, June-July, 1966.

to learn the business through textbooks, imported training materials and subscriptions to foreign poultry magazines. Some of these persons appeared to have learned their lessons well.^{8/}

Entrepreneurs were asked how many hours a day they spent at their farm sites. Table 5-18 shows the distribution of responses.

A few respondents claimed to work in excess of nine hours a day on their sites, but these are lumped into the eight hour cell. In fact the time spent by owners on their farms is not inconsiderable, but the important thing, that cannot be measured by either a questionnaire of simple questioning, is the effectiveness of their supervision or activity. Many farms (perhaps as many as 50) were visited by the writer during the course of this study. On these farm visits, numerous problems, deficiencies, short-comings were apparent. Many glaring problems such as empty water and feed troughs were seen, even when the owner was about. Such neglect, usually shrugged off, does not say much for the effective difference between resident and absentee management. However, other farms were well-run by both resident and absentee owners. Thus an argument can be made that time on the job, and residence on the farm, are not a sine qua none for effective management.

^{8/} Apprenticeship is one technique of training personnel that is not widespread but has implications for costs of production in that several farms use apprentices who work for free to learn the business.

Table 5-18

Hours Spent Daily on their Farms by Entrepreneurs

	Hours Spent Per Day At the Farm								
	0	1	2	3	4	5	6	7	8
Percent of Respondents Spending Relevant Amount of Time	7	9	8	17	8	4	12	20	12
Cumulative Proportion	7	16	24	41	49	53	65	88	100

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Since 1963 the MOA has sponsored annual poultry conferences at the University of Nigeria, Nsukka to which many poultrymen were invited to attend. These conferences, usually four days long, represent a useful media for technical training, provide an opportunity for government and producers to exchange ideas and complaints, and serve to give farmers market and general business information. About one-fifth of the respondents participated in such a conference in any one year (Table 5-19).

Most respondents (85 percent) said they intended to remain in the business, whereas an almost equal number stated they were sorry they had entered. The reasons which explain their present disillusionment with the poultry enterprise is reflected in the changes they would now like to see made.

Most of the 100 respondents made at least two proposals regarding changes they would like to see. The typical poultryman wants a great deal in return for a rather modest effort on his own part. For example: 17 percent want guaranteed profits; guaranteed markets for culls (24 percent) and eggs (27 percent). A further 12 percent want to make the marketing scheme compulsory, which reflects a proposal that poultrymen sell to only a single outlet which in turn provides the ration they need. Conversely 7 percent want a better extension service and a wider market for their eggs (Table 5-20).



Table 5-19

Proportion of Respondents who have Attended the Annual
Poultry Conference held at Nsukka
(1963-1966)

Year - Conference was held	Percent Attending in the given year*
1963	16
1964	20
1965	22
1966	22 (approx.)

* The percentage shows respondents claiming to have attended in a particular year - many persons have gone more than once.

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Table 5-20

Changes in Public Policy Regarding the Commercial Egg
Industry that Poultrymen Would Like

Proposed Changes	Percentage of Sample Wanting It
Government buy all eggs produced	27
Government arrange sale of culls	24
Government guarantee profits	17
Government support feed price	17
Make marketing scheme compulsory	12
Want more free enterprise	7
Better extension service	4
Government help promote egg consumption	3

Compiled by the author from the survey of 100 farmers, June-July, 1966.

Who are the seven percent wanting complete free enterprise? They are seven in number. Four of them are getting more than half of their income from the business, are less than five miles from their markets, and had owners trained in poultry management. Five of these farms said it was their most important business. Six of them had managers trained in poultry. And six had entered the business financed mainly from their own savings. The two critical factors that distinguish themselves seem to be the close proximity of the farms to their outlets and the higher than average level of training. Whether these seven were more or less profitable than the others is unknown.

5. The Poultryman of Eastern Nigeria - An Appraisal

Our poultryman conforms to a rather complex pattern of behavior. On the one hand, we see a wealth of vocational experience; a relatively high level of education, a propensity to save sufficiently to provide the would be investor with several hundreds of pounds of ready cash, and the obvious interest and willingness to use savings in a productive activity. Finally, he is a person who is relatively ambitious and typically something of a success in at least one other activity.

On the other hand, this same poultryman often puts his assets into an industry he understands only poorly. Further, he often does not avail himself of training opportunities open to him. Some farms have neither a trained owner or manager. Owners often seem unable or unwilling to

provide close, constructive supervision over their staff. Finally, poultrymen are generally dissatisfied with the present state of the industry, yet spectacularly fail to support or join the only region-wide organization available to them - the Poultry Producers Association - which can play the role of sounding board, pressure group and spokesman.

Why are poultrymen so willing to enter and stay in business yet seem so unwilling to make a greater personal effort to help themselves succeed? To gain some additional insights into this question, numerous interviews were held with owners and perhaps fifty farms were personally visited. From these first hand experiences a number of observations and deductions have been made.

Many farmers intuitively know better technical and business practices but do not always follow them. In many instances stated-practices by poultrymen varied from witnessed custom. A general problem seems to be a widespread failure to link decision with action. Numerous entrepreneurs know what they would like but, either lack the knowledge of how to do it, or, are unwilling to make the effort. A clear case in point is that of supervision of staff. In many cases, though management complained about sloppy work, the operators either absented themselves from the sites or, if present, failed to give effective leadership or direction. A striking reluctance by operators to make their staffs do

what was wanted was discerned on many farms. When the poor quality of work was remarked upon, responses indicated a tolerance for the condition that bordered on resigned indifference.

A more fundamental problem is implicit in this regard. It often appears that these entrepreneurs are much more capable of, and indeed interested in, initiating their venture (an accomplishment in itself) than seeing a project through to its conclusion. Stated more simply, a marked lack of follow-through and attention to detail seems apparent. Once again respondents seemed aware of these short-comings but for one or another reason, perhaps conflicting claims on their attention, did little to reconcile the condition. Great satisfaction was gained from being in business, and much skill shown in perceiving and responding to opportunity, but the impression was gained in such instances that much of the satisfaction came from talking about what could be as opposed to what realistically was feasible to them. Herculean ends were discussed in terms of Lilliputian means and wills. This tendency, of course differed among respondents but existed in varying degrees with them all. Where a European businessman might feel 'guilty' if he failed to perform, such a failure here was put off with a chuckle.

A further characteristic about entrepreneurs is an apparent brief attention span in that, as problems become more difficult and involved, the operator seems to become confused and lose interest. Instead of

going for help, say to his extension worker, the whole operation is dropped. Repeatedly, in the course of discussion with private persons and with groups, the initial enthusiasm for a new idea seemed to wane when it became evident that understanding or performance might take more than a few minutes. Such characteristics help explain dwindling determination and interest on the part of operators - although an understanding of such behavior must await work from a different discipline than economics.

A more general problem in Nigeria, but one shared by poultrymen, is the lack of understanding of contracts. The notion that an oral or written commitment is somewhat binding is repugnant. One farm called contracts a form of "slavery". Contracts are made, arrangements agreed upon, but they can be unstable. During this study several instances of contract violation were witnessed when poultrymen departed from their contracts when a tempting alternative became available. When the contract was consequently lost the seller appeared bewildered. Once again the cause and effect may not be well understood. It must be conceded that business contracts, and the sanctity thereof, are European and not necessarily Ibo or Ibibio concepts. However, poultrymen are moving into a modern business sector and must learn the new rules sooner or later. The idea that the effects of one's breaking the rules today can come to haunt one tomorrow, or keeping them help you, often does not exist. The time horizon for decision-making is 'now', even when the

poultryman knows in fact that his flock will be around for months needing feed and producing eggs. One can only term this a very relaxed attitude toward the future, indicating that present short-term costs and benefits take precedent over the long-run except under a very favorable discount of the future income stream.

Such observations, if made with regard to the genus homo bureaucraticus governmentalis, could be easily put aside with the comment "after all it is not their money"! Clearly, in this case it is not only the respondents' money, but often is his major source of income financed by his savings. When this question was put to respondents a remarkably uniform response was elicited: if things go wrong the family, or the government, will help us out. In other words, these entrepreneurs, men of experience and education of above the average level, appeared tolerantly prepared to accept reversals fatalistically and with the comforting notion that if all was spoiled, someone would be there to catch them.

This basic attitude, deeply seated in Ibo social organization goes far toward explaining the "slap-dash" attitude visible evident in business and husbandry practices on too many poultry firms. The attitude springs from two separate sources - first, that of a traditional risk-sharing social organization. Secondly, and it would seem more important, the attitude derives (in the case of a publically sponsored industry) from

the relationship of individuals towards government and its works. It must be emphasized that, until very recently, the public sector was (for the Nigerians) an externally imposed body. Nigerians came into contact with this body in one of two ways. One, as an impersonally administered tax-collecting organization, towards which he felt no responsibility, but perhaps some animosity. Two, he saw the government as being one of Europeans who could produce great amounts of largesse for no accountable reason other than "paternalism". It is on these two factors, the lack of feeling of association and responsibility towards government on the part of the individual, and the expectation of "paternalism" from government with no associated reciprocal act emanating from the individual, that seems to underlie many of the attitudes held by poultrymen toward the poultry scheme.

6. Summary

The poultryman of Eastern Nigeria was described and evaluated as an entrepreneur, and to a somewhat lesser extent as a manager. Initially the representative poultryman was compared to those found to be among the most efficient one-third. The distinction was found to lie in the smaller amount of formal education possessed by the latter group whereas the best-one-third supplement this deficiency, successfully, with trade and other business experience. Most poultrymen appear to have had four years in the business at the time of the enumeration, were

located on their family farms, used personal savings as their major source of capital for fixed asset, had a trained manager to operate the farm and did not keep very useful farm records if at all. Three quarters of the respondents earned no more than a quarter of their total income from the activity, although over half viewed it as their most important line of work. Owners seem, typically, to be rather poor poultry managers themselves, partially from lack of training and in part due to social and other environmental conditioning factors. In this latter regard, poultrymen were found to be somewhat better as entrepreneurs than as managers. They seem, on the whole, eager participants in new ventures, but reluctant to immerse themselves in the details required to transfer an initial investment into a continuing success.

CHAPTER 6

COST OF PRODUCTION AND PROFITABILITY OF A REPRESENTATIVE PRODUCING FLOCK

"In order to secure satisfactory returns from anyone of these (poultry) enterprises, the producer must have knowledge of the more important factors affecting returns and he must be a proficient manager capable of taking advantage of every opportunity to secure increased returns from his enterprise. A first hand knowledge of the business and a high degree of managerial ability are two of the most important requisites for success". 1/

1. Introduction

a) Intent of the Chapter

In the following two chapters we shall examine, in some detail, the economics of commercial egg production at the farm site. In this chapter (6), a representative commercial egg farm will be synthesized, using data gathered from a five month farm record study of 21 farms supplemented by the information from the survey of 100 producers. The chapter will detail its costs of operations, and account for them. Its gross and net margins will be calculated. The farm will use the most common layer (RIR) and feed (MOA) ration. Its efficiency of operations will be more or less average. The figures used in the calculations do not represent an actual studied farm, but are rather a synthesis of all

1/ Jull, M. A., Poultry Husbandry, McGraw Hill, Third Edition, 1951, Page 474.

the studied farms. The claim is made that this 'synthetic' farm type is sufficiently representative of enough farms as to be able to function in a useful analytic role. We shall not discuss, specifically, the population sampled; but rather deductions made from the sample; the synthetic farm represents more than a simple average of the studied farms. In the next chapter, an effort will be made to explain the level of efficiency attained by this farm type and suggestions made as to how, by improved management, this level might be improved. The level of competence, background and training should be viewed as that of the representative entrepreneur in Chapter 5.

The profitability of the representative farm will vary from province to province (as the local price of eggs varies by district) reflecting the influence of location upon long-run survivability of the producing units. Thus a separate net margin will be produced for the representative farm in each of six locations allowing a reasonably good picture to be found as to the performance of such a farm under differing economic conditions.

Once we have examined the cost structure of the typical farm, additional synthetic types will be postulated in the following Chapter (7). These types will represent different combinations of observed data as to size, efficiency, hen type, feed type, against varying revenues (reflecting the different provincial prices) to see whether some combination - or synthetic type - holds better promise for survivability in one or many

of the possible locations. With this analytic framework we shall examine the economic prospects to poultrymen and the industry at large which follow from varying economic policy variables in Chapter (8).

2/
b) Methodology Used in the Chapter

Basic farm management material gathered from a detailed study of 33 flocks on 21 farms, and from a survey of 100 poultry farms in six provinces of Eastern Nigeria provides grist for the analysis developed in this chapter. This information, combined with such standard economic data as prices of chicks, labor, feed and eggs, will be used to prepare a partial budget of a synthetic farm representing the common commercial egg farm type found in the region. First, the total variable cost (TVC) of production per dozen eggs will be calculated and then, by deducting this sum from the total revenue (TR) per dozen eggs in a given province, a gross margin will be estimated. Finally, after making suitable deductions for depreciation and interest on capital invested in the enterprise, the net margin, or long-run profit, will be revealed.

The basic unit of analysis will be the flock, a unit composed of hens of like-age and breed, of some typical size and efficiency under typical management. The costs incurred in handling this unit to produce eggs

2/ The data used to develop the material presented in this chapter was obtained in a farm record survey conducted by the author during the last half of 1966. The detailed methodology appears in the appendix under phase II.

will be expressed in 'per-dozen' terms, the standard unit of measurement of egg production.

2. Budgeting - Its Purpose and Method

Budgeting is a method of comparing alternative economic organizations to determine, and account for, their relative profitability. The technique, as used in the following analysis, combines the components of cost and revenue for a given organization to produce a gross margin, which represents the remainder of TR less TVC. If a budget is drawn for all enterprises contemplated by the farm, the process is termed a total budget. However, one may study a single enterprise in isolation, say a poultry enterprise, or one of its flocks, changing one assumption at a time - ceteris paribus - to observe its effect on the dependent variable and thus on profitability. This procedure, followed below, is partial budgeting.

The technique has its limitations. Although a useful tool for choosing between enterprises, factor combinations, and technologies, and for demonstrating their comparative profitability, the technique will not automatically identify optimal levels of operation. In fact no attempt will be made in this analysis to identify such a level, rather the emphasis will focus entirely upon present organization, the economic effects of their organization and ultimately upon policy.

Budgeting as a analytic method rests on three assumptions: (1) perfect competition, (2) factor proportionality and (3) the linear properties of the assumed production function. Such assumptions seem justified in the case of the poultry industry. Individual egg producing firms cannot of their independent actions normally influence prices of inputs purchased or product prices. The three hundred odd commercial producers purchase all their feed from two sellers and sell most of their eggs either to the egg marketing scheme or to various wholesalers or retailers. Also, ^{3/} the final product is homogeneous.

The methodology of budget analysis requires that the assumption of fixed factor proportionality be made. This assumption is evidently consistent with reality insofar as the combination of feed and hens are concerned (the two most important variable inputs). The assumption of fixed factor proportionality implies that over the relevant range of activity (up to the limit of the capacity of the deep-litter floor) a straight-line cost function exists. Such a function presumes perfect divisibility to exist with respect to the variable inputs - which is to say, there will be no change in the efficiency with which these inputs combine at different levels of activity. Such conditions seem to be met in the case of this

^{3/} This statement must be qualified. If eggs are graded the gross output can no longer be viewed as purely homogeneous. But within any classification the eggs from any one farm are indistinguishable from those of any other.

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industry which also allows the third budgeting assumption, linearity, to be met.

The assumption of linearity is to the effect that all costs (other than fixed) - that is to say the aggregate variable costs - rise or fall in the same proportion as the quantity of output produced, if management is combining these inputs optimally. Further, beyond some output level - say the limit of the litter floor - expansion is impossible due to the restriction on the capacity of the fixed inputs.

As the analysis will restrict itself to the cost of production of a dozen eggs by a single flock, there seems little point to expand the discussion into the long-run when the owner-operator is free to vary the size of his plant, labor force and/or move to evident alternative enterprises.

One departure from the normal technique of partial budgeting will be made. As they are often utilized, partial budgets represent a special manner of handling essentially accounting data. Thus the product of the cost side of the ledger will include both fixed and variable costs which sum to a total cost of production. This method has limitations in circumstances where it is difficult to assign prices to all inputs, and where the structure of interest rates are as little developed as in Eastern Nigeria. Also, depreciation rates remain an unknown quantity as the

longevity of the poultry houses are still moot. For these reasons the analysis will first of all focus upon the gross margin.

A gross margin is calculated as net of total return less the total variable cost, per unit of output. This method has the virtue of allowing different prices to be assigned to the fixed input to see what the possible effects will be upon the net margin or final return to management. Were a purely accounting method used (and experiments were made in this direction early in the analysis) the total costs become so substantial as to make most producers economically unviable to any length-of-run longer than the life of a producing flock, which outcome mis-states the actual economic behavior of the farms.

This is aptly illustrated by the local custom by which it is morally incumbent upon a man who can afford to operate a business to provide for his less fortunate kinsmen by offering them employment in the business though their marginal productivity may be very low. In return for his labor input the owner may provide the relative with some cash (usually no more than half the going wage given to the hired staff) and room and board. These charges ought not, strictly speaking, be debited against the egg enterprise as they are more a consumption item to the owner (which charges he would have to meet somehow whether the poultry operations were there or not). If included, the costs of operation would be overstated with the result of mis-stating the true economic circumstances

of the firm. Although not included in the calculation involved in the gross margin, a deduction for family labor will be calculated to illustrate its possible long-term impact on the net margin.

3. Variable Costs in Egg Production

The commercial production of eggs is a business enterprise. An intensive husbandry technology, such as deep-litter, involves placing hens in confinement where they may be fed sufficient quantities of feed such that they may simultaneously support themselves and produce enough eggs to make the enterprise at least break-even. The poultry manager must efficiently combine: hens, feed, labor, housing and utilities. Each of these inputs must be purchased and the enterprise repaid for them from the sale of eggs, culls, perhaps litter, and eventually the flock.

The purchase of an input represents a cost to the enterprise. Costs may be viewed as fixed or variable depending upon the economic longevity of the input and the planning term involved. In commercial egg production three planning periods (in the Marshallian sense) may be identified. The shortest term involves only day-to-day adjustments in flock management: changes in feed levels, rates of culling, number of hired persons. In an intermediate planning period the proportion of factors variable to management increases; most important, the size and composition of the flock can be determined. In the longest run, which transcends the lives of many flocks, housing needs can be adjusted.

For this analysis variable costs, being costs which can be influenced over the life of one producing flock, will absorb most of our attention.

Costs of product per dozen may be expected to vary with size of the flock, size of the whole enterprise, the type of layer, the locations of the firms and with the efficiency of management.

a) Characteristics of the Synthetic (Representative) Egg Producer

Commercial egg production rests upon the efficiency with which the hen can convert feed to eggs. Such conversion and rate of production may be expressed in terms which make them comparable among flocks so that the quality of hen and management are revealed. To develop records that are useful to management all the birds in a flock must be of exactly the same hatch date and breed. These records can give the feed conversion ratio (pounds of feed per dozen eggs) and percent production (eggs per hundred birds per week). Such ratios were produced from the 28 flock records.^{4/}

The study did not continue sufficiently long for a record to be maintained over an entire laying life; so that only five months of any flock's life could be studied. To develop efficiency ratios an entire life history is required from a flock composed of a single hen type. As

Thirty-three flock records were kept by 21 farms over a five month period. Some of these flocks were pullets during the whole period so that only 28 laying-flock histories were obtained. These records yielded entirely technical data: pounds of feed used, number of eggs laid, mortality and so forth. Moreover, they represented flocks of varying sizes and hen type.

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living creatures, chickens perform differently at different ages. Rates of egg production and the efficiency with which they convert feed to eggs are the function of age and these characteristics vary among different kinds of chickens.

To overcome the constraint placed by time, synthetic flock histories had to be developed. The assumption was made that all birds of particular breed perform identically, such that ^{5/}variations from known norms may be assigned to management. A synthetic flock history was assembled in the following way:

1. All hatch dates were gathered on date-breed basis.
2. The current age of the flock at the time of starting the farm records was noted.
3. The age at the end of the five month period, or laying life (whichever came first), was recorded.
4. All the records were kept on a per-flock basis and all the birds in a flock were of the same hatch-date.

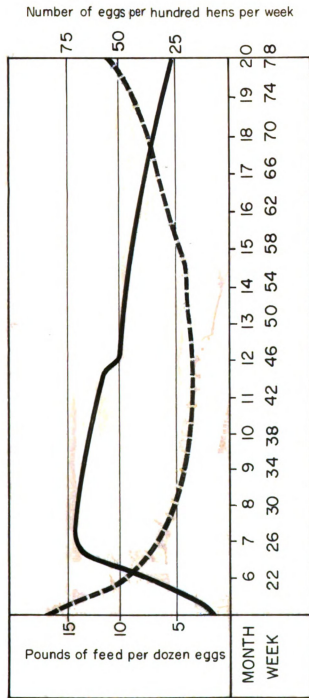
Flocks begin to lay at about 22 weeks of age, and continue for some 58 weeks. Insofar as possible, flocks were selected such that each breed was represented in the study for every week of its laying life so as to provide a continuous record of the breed's performance for the entire

^{5/} The details of this methodology are developed under phase II, in the appendix. The management variable includes housing, culling, health, watering, feed and vice control.

production period. Performance figures: feed-egg conversion, percentage production, livability, eggs per hen housed, and eggs per hen per week could be assembled against the independent variable - time. A dispersion of the different performance figures were generated, per breed; over time, which dispersion could be subjected to simple linear regression analysis, the final $\bar{Y}$ representing the 'typical' performance figure. A straight-line is a less than perfect description of hen performance over time, which actually more resembles a skewed arc (Graph 6-1), consequently poor fits were obtained. Extreme observations were dropped and the figures representing the early production period ignored as these give an entirely unrealistic picture of life-long performance (for example, in the 22nd week a hen may eat 1.8 pounds of feed and lay one egg!).

Hens typically arrive at a farm as day-old chicks. For the first twenty-two weeks of their lives they produce no eggs - but must be fed. After a flock begins to lay (normally at the 22nd week), output rises quickly from less than 5 percent (five eggs per hundred hens per day) to nearly 70 percent by the 30th week. This level may be sustained for a few weeks; then a gradual tapering off begins until by the seventieth week of age, very low levels are reached, when the flock is disposed of. The rate at which this decline sets in is affected by breed, feeding and watering which, together and separately, greatly influence the average rate of production over the life history. The efficiency with which hens

Graph 6-1 FEED-EGG CONVERSION AND % PRODUCTION FOR 28 LAYING FLOCKS IN EASTERN NIGERIA



MONTH AND WEEK FROM DAY OF HATCH

prepared by the author from data calculated from six month survey of farm records.

LEGEND

— Eggs per month

- - - Pounds feed per doz. eggs

convert feed to eggs becomes as a mirror image of the rate of production; it too being biologically determined (Graph 6-1). Absolute levels of efficiency, however, are a function of management. The flock must be fed enough to support its biological processes and then have enough left over to produce eggs. A third very important criteria of operational efficiency is mortality. Death occurring late in the rearing period, or early in the laying period, represents a considerable loss to the produce in foregone production and thus revenue.

Two additional measures of efficiency are: (1) egg per week per hen; and (2) per hen production of eggs over the laying life. These five efficiency indicators afford direct and meaningful standards of comparison between; types of hens, sizes of flocks, feeding patterns and the general capacity of management. Such characteristics must be developed if cost of production figures are to be generated (Table 6-1).

b) The Representative Synthetic Farm

A 'typical' poultry farm is likely to manifest the following characteristics. It will possess one cement block deep-litter house which cost about £250 (\$700). This unit houses two large flocks of 200 each and, periodically, one flock of growers^{6/}. The hens will most likely be MOA/RIR and there

^{6/} A grower flock is of 500 chicks (if unsexed) and half this number if sexed. All flocks of MOA/RIR day-old chicks are unsexed.

Table 6-1

Efficiency Characteristics of the Representative MOA/RIR
fed MOA Feed*

Characteristics	Representative MOA/RIR
Pounds of feed required to produce a dozen eggs	8.8
Eggs per day per 100 hens	40
Percent mortality of laying flock	20
Eggs per week (per hen) over laying life of flock	2.8
Per hen production over laying life	146 (12 doz.)

*The manner in which each figure is calculated is described in the text.

Source: Data prepared by author from field survey on 21 farms in late 1966.

Lesson 1

Read the following passage and answer the questions.

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The tenth part of the lesson.

The eleventh part of the lesson.

is a more than even chance that they will be fed MOA ration. Two hired men are normally employed (and one family member will do some work in the house as well).

c) Variable Costs of Production of Commercial Eggs

Using the characteristics of technical efficiency outlined for a synthetic farm of representative type, and the following economic parameters, a partial budget for commercial egg production on such a farm can be calculated to produce an estimate of the cost of production for a dozen eggs. Item by item, the variable charges to a commercial egg operation are:

- i. Cost of Feed is the quantity of feed (in pounds) used to produce a dozen eggs times the respective cost per pound of feed;
- ii. Cost of Flock Replacement is the cost of the reared flock up to point-of-lay, less salvage and revenues from culls. The cost-of-rearing a flock is the sum of the cost of the original stock of day-old chicks, plus the cost of feed over the rearing period, plus the associated labor and brooder (kerosene) charges less the revenue from cockerels sold at twelve weeks of age.
- iii. Cost of Labor is calculated by taking the annual cost of hired non-family labor for the entire poultry enterprise, and dividing by the number of tended flocks.
- iv. Other Charges: maintenance, litter and so forth are separately small and have been arbitrarily assumed together to be uniform at 1 d. per dozen eggs for RIR.

d. Cost of Production Calculated for a Representative Flock

Each of the four elements of cost specified above will be calculated separately and then summed to produce the TVC of production for a dozen eggs. The exercise will consider the cost of production for a flock of MOA-RIR fed on MOA-feed handled by a representative poultryman sustaining typical levels of feed conversion production and livability.

1. Cost of feed - MOA-RIR were found to be converting feed to eggs at a rate of 8.8 pounds per dozen eggs. MOA feed costs 3.2 d. per pound; so the incremental cost is 28.2 d. per dozen eggs.

7/
2. Hen depreciation - This calculation involves three steps. First, the cost of rearing the layer flock to point-of-lay must be determined. Second, the layer flock must be adjusted to account for deaths and culls and the salvage value calculated. Finally, this last figure is divided by the number of hens at point-of-lay to produce the depreciation per hen.

To bring 200 MOA/RIR pullets to point-of-lay, a farmer must purchase 470 day-old chicks; half of whom will be male (as such stock is unsexed) and a sufficient margin to offset the normal 15 percent mortality must be purchased as well.

The calculation is complicated by the presence of joint costs incurred in rearing cockerels (in unsexed flocks) up to at least 12 weeks of age, which has been worked out separately below.

7/ The term 'hen depreciation' is an accepted one in poultry management and describes the decline in value of a flock over its laying life from point-of-lay to the time of disposal.

The cost of rearing RIR pullets for 22 weeks up to the point-of-lay on MOA feed; is as follows (expressed in pence):

Purchase of day-old chicks - 235 females at 15 d. each	3525 d.
Feed, 26 lbs. at 3.2 d/lb for 200 pullets ^{8/}	16640
Labor	2368
Other (6 d. each)	1200
Total cost	23733 d.

From this cost we must deduct the net revenue from the sale of cockerels, which were grown for 12 weeks and then sold:

Purchase of day-old chicks - 235 males at 15 d. each	3525 d.
Feed, 9 lbs. at 3.2 d/lb for 200 cockerels	5760
Labor	888
Other (3 d. each)	600
Total cost	10773 d.
Gross revenue from sale of cockerels (90 d. each)	18000
Net revenue	7227 d.

The deduction of the net revenue from the sale of cockerels from the total cost of rearing pullets leaves a net rearing cost of the layer flock of 16,506 d., or about £ 69 (\$190).

8/ As most grower casualties occur in the first few days when per chick feed consumption is very small, feed consumption for the 200 survivors alone is considered for simplicity sake.

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The net rearing cost is adversely affected if the cockerels cannot be disposed of promptly. It is not at all unusual for such a flock, or a portion of it, to linger on for several weeks until completely sold. This reflects the very small market for quantities of birds available at one time. This situation will in many cases add to the cost of production of eggs above the level used in this paper. If a flock of 200 cockerels were retained for an extra four weeks (to 16 weeks of age), the marginal cost will be 3496 d. which will act to reduce net revenues from the flock to 3731 d. The net cost of production of pullets will correspondingly increase to 1987 d. (£ 83 or \$224). It is for this reason that farmers are persistent in their demand that either flocks be sexed or some provision be made for the prompt disposal of cockerels. As will become evident, for a great many poultrymen, this extra margin of cost can make the difference between profit and loss on the egg enterprise.

With the value of the point-of-lay flock it is possible to calculate the hen depreciation. It is assumed (supported by observations at the farm sites) that some 15 percent of the initial layer flock will be culled and that 20 percent of a representative flock will die during the year it is kept on litter. Thus the size of the flock at time of disposal is 130.

Value at point-of-lay (200 hens)	16,506 d.
Salvage value of flock and culls (160 hens) (which sell at 84 d. each)	13,440
Hen depreciation	<u>3,066 d.</u>

The value of the laying flock declines, 3066 pence over the laying year, which is 23.6 d. per hen and 1.94 d. per dozen eggs.

3. Labor - The representative farm has a normal staff of two hired persons. The survey of 100 farms revealed the monthly wage to vary considerably, both between and within the various provinces. Most employers supplemented cash wages with meals and sometimes a bed in the egg room. If meals are valued at 25/- (\$3.50) and the typical hired worker is paid \$8.00 in cash each month the total monthly labor bills to the enterprise as a whole is £ 8 (\$22.40) or £ 96 per year.

As the typical farm usually must allocate its staff over three flocks (two layer and a grower), and the net size of the layer flock is 130 (allocating the cost to the living birds). The labor cost per flock then is found to be 7680 d. This works out to be 59 d. per hen and 4.9 d. per dozen eggs.

4. Other - Many charges were separately found to be very small on a cost per dozen egg basis: litter, repair and maintenance, transport. Hence a flat charge of 1 d. is given to cover all these costs, collectively (in the case of hybrid flocks this flat charge is imputed to .7 d.).

e. Total Cost of Production of a Dozen Eggs

Summing up the incremental costs involved in producing a dozen Commercial eggs on a representative farm in Eastern Nigeria, the following total cost is revealed:

Feed	28.2 d.	(78%)
Labor	4.9	(14%)
Hen depreciation	1.9	(5%)
Other	1.0	(3%)
	36.0 d.	(100%)

The low wage rates paid in the region explain in part a cost composition different from that found on American poultry farms which have in addition to a high proportionate feed cost, a much higher comparative share from wages. This total cost, it must be restated, is on a farm feeding subsidized ration. Later it will be shown that if all other factors are held constant, the removal of this subsidy will increase total cost (of itself) by 60 percent.

f. The Gross Margin for a Representative Farm

The gross margin is the difference between the TVC and TR. The price paid per dozen varies by nearly a shilling (.14¢) in different provinces, from 42 d. to 53 d., but the average price is 46 d. or about four shillings (.55¢) (Table 6-2).

The average farm, under typical management, can earn a positive gross margin in all six provinces at prices current in 1966. Their short-run viability is therefore assured. Failure to dispose of the cockerels could, however, seriously narrow the margin.

Table 6-2

Gross Margins per dozen Eggs for Representative Producer
Type in Six Provinces using RIR fed MOA Feed

(in pence)

Province	TR*	-	TVC	=	Gross Margin per dozen Eggs
Abakaliki**	(3/6) 42		36		6
Enugu**	(3/7) 43		36		7
Onitsha**	(3/9) 46		36		10
Owerri	(3/9) 46		36		10
Port Harcourt	(4/5) 53		36		17
Umuahia	(4/5) 53		36		17

* Prices are those at the farm gate for average size eggs.

** Provinces where the egg marketing scheme functions.

Furthermore, the assumption is implicitly made that farms could in all cases readily dispose of their eggs in each province. This has not always been true especially in provinces more remote from the Port Harcourt market. Failure to sell promptly would reduce the gross margins proportionately to the particular circumstances.

g. Calculation of the Net Margin

As the gross margin is a guideline for economic success in the short-run (say two years, ceteris paribus, in the case of the studied synthetic type), so the net margin is an indicator of the firm's longer-term prospects. The difference is comprised of at least two deductions which the firm must eventually acknowledge even if these can be postponed for the present. One of these is the cost of depreciation of buildings and equipment. The other is the interest on capital investment in the enterprise. This latter is essentially an opportunity cost signal which the poultry investor must realize and consider as alternative investments become visible over time. A final deduction, which might be made, but will not be, is that for family labor. Although a calculation is made for completeness sake the deduction will not be made, as the support of a family member, as argued above, is viewed as a consumption rather than production item.

1. Depreciation - Housing is an investment which yields a stream of productivity over time; a period transcending the active lives of many

flocks. Depreciation is a method of charging current production for its share of this stream, which charge is to be credited against a 'sinking fund' that will eventually be used to replace the present house. The amount of the deduction for depreciation is a function of the estimated expected life of the building. Poultry houses, as they are typically constructed in Eastern Nigeria (of low quality cement blocks with a metal roof) may last 12 years (with adequate maintenance). The representative house cost £250 (\$700) to build and can hold three flocks, in separate pens, at a time.

If a house lasts 12 years and a flock survives for one and a half years, then about 22 flocks will be housed in it over the life of the building (assuming a new flock is started every six months, such that from the middle of the second year three flocks are continuously maintained). If the average laying flock terminates with 130 hens then 2860 hens will be eventually housed who pay for the house through their egg production. A house should provide 2.5 square feet of space per hen housed.^{9/} In Eastern Nigeria the cost of housing per flock is 2727 d.; based on the division of cost of the average space available by hens housed on representative farms. This figure divided by 130 hens and finally by their individual production yields a cost of depreciation per dozen eggs of 1.7 d.

^{9/} This is a standard density ratio recommended by poultrymen under tropical conditions. Any greater density brings about an increase in vices and loss of egg production, possibly as a result of greater unrest among the flock when less comfortable. In the United States this figure is about 1 square foot per hen.

A similar figure could be produced for the depreciation of equipment within the building (waterers, feeders, etc.) but this cost was found to be very small and is, therefore, ignored.

2. Interest on Capital Invested in the Enterprise - The capital invested in an enterprise is not free to the enterprise. Capital put in one venture is money that could be used elsewhere, thus it must be charged at its next best employment rate. In the United States this rate of interest is often taken to be the going interest rate on savings at a bank. The situation is less clear in Eastern Nigeria. The rates of return to alternative investments, say palm oil, are not yet available. One alternative is the rate of interest on loans, which are an estimated 10 percent from the banks. Privately made loans likely bring a greater return. The Government of Eastern Nigeria uses 7 percent in making its calculations. I have chosen 10 percent as the opportunity cost of the use of funds in poultry rather than in the loan market.

Capital is invested in substantial sums in two points of the poultry enterprise: housing and the layer flocks. A separate figure must, therefore, be provided for each.

With respect to the increment to total costs from the capital invested in housing, this sum is calculated by taking 10 percent of the average value of the house (imputed to be half the initial cost) for the

12 year period. When broken down to a cost per dozen egg basis, it is 1.2 d.

3. Calculation of the Net Margin - The net margin is obtained by deducting the incremental charges from the gross margin which total 2.9 d. This is done for the gross margin of the representative operation in each of the six provinces (Table 6-3).

These net margins indicate that if the representative farm has been able to dispose of its cockerels and eggs promptly, they will earn a positive margin to their owners in the long-run. Even where family labor is debited against such an operation (estimated in the typical case to be 1.5 d. per dozen)^{10/} the enterprise would remain viable.

4. Summary

The chapter has considered the methodology of analysis and cost structure of the production of a dozen eggs by a RIR flock fed MOA feed on a representative commercial egg operation. The farm is representative in the sense that it is 'synthesized' from a sample of 21 farms and 33 flocks studied over a six month period in six provinces of Eastern Nigeria. Such a farm has two layer and one grower flock of 235 and 200 birds respectively. The growers are purchased unsexed and cockerels are sold,

^{10/} It should be pointed out that the implicit cost to the entrepreneur is not included in the net margin as the amount of entrepreneur's time is known to vary enormously among farms (Table 5-18).

1. The first part of the report is a summary of the work done during the year.

2. The second part is a list of the publications.

3. The third part is a list of the names of the persons who have been working on the project.

4. The fourth part is a list of the names of the persons who have been working on the project.

5. The fifth part is a list of the names of the persons who have been working on the project.

6. The sixth part is a list of the names of the persons who have been working on the project.

7. The seventh part is a list of the names of the persons who have been working on the project.

8. The eighth part is a list of the names of the persons who have been working on the project.

9. The ninth part is a list of the names of the persons who have been working on the project.

10. The tenth part is a list of the names of the persons who have been working on the project.

11. The eleventh part is a list of the names of the persons who have been working on the project.

12. The twelfth part is a list of the names of the persons who have been working on the project.

13. The thirteenth part is a list of the names of the persons who have been working on the project.

14. The fourteenth part is a list of the names of the persons who have been working on the project.

15. The fifteenth part is a list of the names of the persons who have been working on the project.

16. The sixteenth part is a list of the names of the persons who have been working on the project.

17. The seventeenth part is a list of the names of the persons who have been working on the project.

18. The eighteenth part is a list of the names of the persons who have been working on the project.

19. The nineteenth part is a list of the names of the persons who have been working on the project.

Table 6-3

Net Margins per dozen Eggs for a Representative Producer
Type in Six Provinces using RIR fed MOA Feed

(in pence)

Province	Gross Margins	-	Total Deductions	=	Net Margins
Abakaliki	6		2.9		3.1
Enugu	7		2.9		4.1
Onitsha	10		2.9		7.1
Owerri	10		2.9		7.1
Port Harcourt	17		2.9		14.1
Umuahia	17		2.9		14.1

if possible, at twelve weeks of age. The farm has two hired men and operates one house. The operation is not ideally sited. The owner conforms to the description of a typical poultryman described in chapter 5.

The measures of efficiency of operation are as follows: feed per dozen eggs, 8.8 lbs; eggs per day per 100 hens, 40; mortality, 20 percent; eggs per hen over its laying life, 12 dozens.

In all the studied provinces the representative farm is able to earn both a positive gross and net margin if it is able to dispose of its cockerels promptly and sell its eggs. A typical farm in Eastern Nigeria, under typical management, can profit in the long-run using unsexed dual-purpose stock with subsidized feed even when poorly located. If well-sited, near the large Port Harcourt market, such a farm can earn a net margin of 14 d. per dozen (nearly .17¢).

CHAPTER 7

PROFITABILITY OF COMMERCIAL EGG PRODUCTION IN EASTERN NIGERIA

"An ill-favoured thing sir.....but mine own"

Shakespeare
As You Like It

1. Introduction

This chapter will expand the analysis begun in Chapter 6; employing the same methodology. Gross and net margins will be calculated for five additional types of synthetic enterprise: (1) representative; (2) best one-third; (3) small scale; (4) medium scale; (5) large scale. A separate calculation will be made within each of these classifications for hybrid and RIR and for both types on MOA and Pfizer feed. Twenty separate gross and net margins will be produced in each group and these tested in six provinces, to examine the short and long-term economic prospects of commercial egg producers. An analysis of the composition of the costs of production can give some idea as to what changes may be made on a particular farm type to improve its economic prospects. Finally, the

1/ Only one technology, deep-litter, will be considered reflecting this system's almost universal presence. Only three battery cage operations are known to exist, all around Port Harcourt.

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analysis will provide a framework within which public policy may be considered in the following chapter.

2. Calculation of the Gross Margins for the Studied Synthetic Enterprises

In this section the gross margins will be produced for all five organizations in their various ramifications. Most of the calculations appear on the accompanying tables, which follow the analytic method presented in the sample case in the previous chapter.

The basic characteristics of these firms are first considered (Table 7-1). Each study-type represents a unique combination of number of flocks, size of flocks, size of staff and number of (and investment in) houses. These differences make themselves felt on the cost-per-dozen eggs which figure, presented as a gross and net margin, will illustrate the comparative and absolute profitability of the studied operations.

Each classification operates at its own level of efficiency (Table 7-2a and 7-2b). The best one-third producers (using RIR) for example, have a comparatively low feed-egg conversion ration (5.7 lbs. per dozen), produce the greatest number of eggs (170 per hen) and have the second lowest level of layer mortality (17 percent). The smallest producers are seen to be the least efficient in all categories; or they compare closely with the second poorest - the middle size producer. A small operation typically converts feed to eggs at 13.2 lbs. per dozen, obtains 133 eggs

Table 7-1

Basic Characteristics of the Synthetic Layer Enterprises
in the Five Studied Classifications

Flock Type	Number of Flocks		Size of Flocks		No. of Hired Men	No. of Houses
	Grower	Layer	Grower*	Layer**		
Representative	1	2	235	200	2	1
Best one-third	1	3	590	500	1	2
Small scale	1	1	118	100	1	1
Medium scale	1	2	353	300	2	1
Large scale	2	4	590	500	3	2

* Number of pullets at time of purchase.

** At point of lay.

Calculated by the author from data collected in farm surveys.



Table 7-2a
Technical Characteristics of the Studied Classifications
using RIR Stock
(Average Over Entire Laying Life)

Characteristics	Rep. Flock	Best one-third	Small	Medium	Large
Feed-egg conversion ratio (lbs. per dozen eggs)	8.8	5.7	13.2	12.0	9.0
Percent of production	40	47	38	37	46
Eggs per week, per hen	2.8	3.3	2.5	2.5	3.3
Number of eggs produced over laying life	146	170	133	129	170
Mortality	20%	17%	32%	32%	14%

Calculated by the author from data collected in farm surveys.

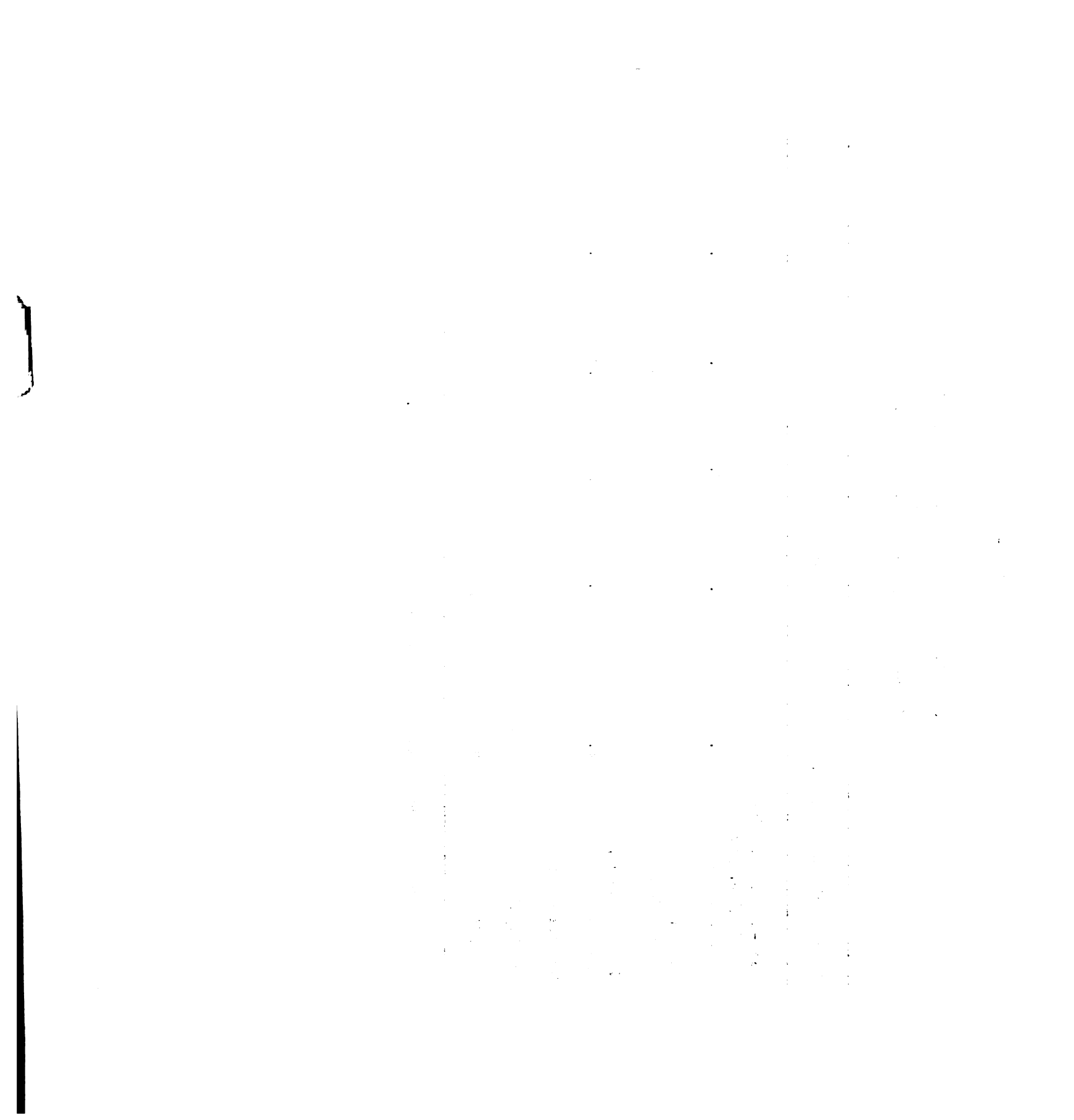


Table 7-2b

Technical Characteristics of the Studied Classifications
using Hybrid Stock
(Average over Entire Laying Life)

Characteristics	Rep. Flock	Best one-third	Small	Medium	Large
Feed-egg conversion ratio (lbs. per dozen eggs)	5.9	3.8	8.8	8.0	6.0
Percent of Production	59	71	56	55	70
Eggs per week, per hen	4.2	5.0	3.8	3.7	5.0
Number of eggs produced over laying life	218	256	199	193	256
Mortality	8%	7%	13%	13%	6%

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Calculated by the author from data collected in farm surveys.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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per hen, and suffers a 32 percent mortality. The large scale producers are comparatively efficient enterprises at 9.1 lbs per dozen, 170 eggs per hen and 14 percent mortality. Many of this group are identical to the producers in the best one-third. In fact, five of the seven best farmers in the survey are large and one each small and middle. Further, hybrids are the most efficient stock for all classes of operation. Typically, the small operator, with hybrids, can convert feed to egg at 8.8 lbs. per dozen, the larger operator at 6 lbs. per dozen and the best one-third at 3.8 lbs. Mortality is markedly lower as well: 13 percent for small, 6 percent for large and 7 percent for best one-third.

No significant difference was found between the two feed types other than price - MOA costing two-thirds of the price of Pfizer. Feed-egg conversion figures expressed in value terms appear in Table 7-3. Large operators use feed about as well as the representative, while small operations spend half again as much for feed per dozen eggs produced. The best one-third operations produce a dozen eggs at only two-thirds the cost for feed of the representative and large operations and at only 40 percent of the cost incurred by the small producer.

Hen flock depreciation is a very important part of the total cost-of-production. The cost-of-rearing to point-of-lay appears in Table 7-4a and 7-4b and flock depreciation in Table 7-5a and 7-5b. In the case of best one-third operators, using RIR on MOA, the cost per dozen becomes

Table 7-3

Cost of Feed per Dozen Eggs on the Studied Flocks using
MOA and Commercial Feed

a. MOA Feed; 3.2 d. per lb.

Layer Type	Representative	Best one-third	Small	Medium	Large
RIR	28.2	18.2	42.2	38.4	28.8
Hybrid	18.9	12.2	28.2	25.6	19.2

b. Pfizer Feed; 4.8 d. per lb.

RIR	42.2	27.4	63.5	57.6	43.2
Hybrid	28.3	18.2	42.2	38.4	28.8

Calculated by the author from data collected in farm surveys.

Table 7-4a

Cost of Synthetic Point-of-lay RIR Flock on MOA and
Commercial Feed

(in pence)

1. MOA Feed

Flock Type	Flock Size		Cost of Rearing			Net Rev. from 2/ Cockerels	Net Cost of Rearing
	Chicks	Pullets (Number)	Chicks 1/ Total	Feed	Labor Others		
Representative	235	200	3525	16640	2368 1200	23733 7227	16506
Best one-third	590	500	8850	41600	1184 3000	54634 19806	34828
Small	118	100	1770	8320	1770 600	12460 3090	9370
Medium	353	300	5295	24960	2368 1800	34423 11277	23146
Large	590	500	8850	41600	1770 3000	55220 19590	35630

2. Commercial Feed

Representative	235	200	3525	24960	2368 1200	32053 4347	27706
Best one-third	590	500	8850	62400	1184 3000	75434 12606	62828
Small	118	100	1770	12480	1770 600	16620 1950	14670
Medium	353	300	5295	37440	2368 1800	46903 6957	39946
Large	590	500	8850	62400	1770 3000	76020 12390	63630

1/ Price per chick is 15 d.

2/ Assuming typical cockerel is sold at 12 weeks of age.

Calculated by the author from data collected in farm surveys.



Table 7-4b

Cost of Synthetic Point-of-lay Hybrid Flock on MOA and
Commercial Feed

(in pence)

1. MOA Feed

Flock Type	Flock Size		Cost of Rearing			Total Cost of Rearing
	Chicks	Pullets (Number)	Chicks 1/	Feed	Labor Other	
Representative	235	200	11515	16640	3256 1200	32611
Best one-third	590	500	28910	41600	1628 3000	75138
Small	118	100	5782	8230	2442 600	17144
Medium	353	300	17297	24960	3256 1800	47313
Large	590	500	28910	41600	2442 3000	75952

2. Commercial Feed

Representative	235	200	11515	24960	3256 1200	40931
Best one-third	590	500	28910	62400	1628 3000	95938
Small	118	100	5782	12480	2442 600	21304
Medium	353	300	17297	37440	3256 1800	59793
Large	590	500	28910	62400	2442 3000	96752

1/ Price per chick is 49 d.

Calculated by the author from data collected in farm surveys.

Table 7-5a

Cost of Hen Depreciation for Synthetic RIR Flocks on MOA and
Commercial Feed

1. MOA Feed

Flock Type	Value at Point-of-lay	Size of Flock	Mortality %	No. dead	1/ Culls	Size of flock at time of disposal	Salvage value of flock and culls <u>2/</u>	Flock Dep.	Per Hen	Depreciation Per Eggs
Representative	16506 d.	200	20	40	30	130	13440 d.	-3066	23.6	1.94
Best one-third	34828	500	17	85	75	340	34860	+ 32	+ .1	-
Small	9370	100	32	32	15	53	5712	-3658	- 69.2	6.24
Medium	23146	300	32	96	45	159	17136	-6010	- 38.0	3.5
Large	35630	500	14	70	75	355	36120	+ 490	+ 11.0	+0.8

2. Commercial Feed

Representative	27706	200	20	40	30	130	13440	-14266	-110.0	9.0
Best one-third	62828	500	17	85	75	340	34860	-27968	- 82.2	5.8
Small	14670	100	32	32	15	53	5712	- 8958	-169.0	15.2
Medium	39946	300	32	96	45	159	17136	-22810	-143.5	13.3
Large	63630	500	14	70	75	355	36120	27510	- 77.4	5.5

1/ Assuming 15 percent of point-of-lay flock is culled.

2/ Assuming that culls and hens sold at end of laying period fetch 84 d. each.

Calculated by the author from data collected in farm surveys.

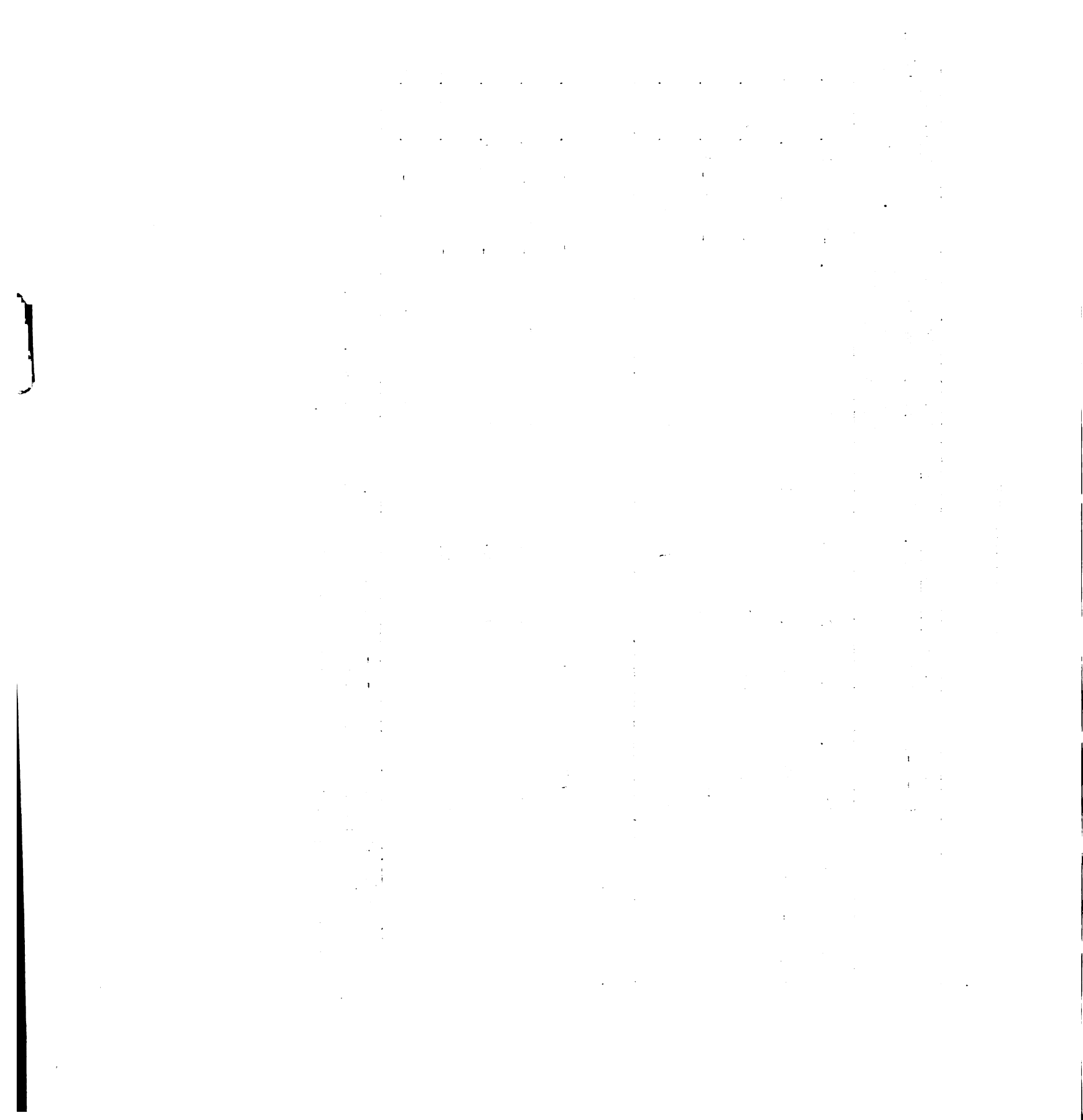


Table 7-5b

Cost of Hen Depreciation for Synthetic Flock of Hybrids on MOA
and Commercial Feed

1. MOA Feed

Flock Type	Value at Point-of-lay	Size of flock	Mortality %	No. dead	1/ Culls	Net size of flock at time of disposal	Salvage value of flock & culls 2/	Flock Dep.	Per Hen	Depreciation Per Doz Eggs
Representative	32611	200	8	16	30	154	23856	- 8755	155.0	12.7
Best one-third	75138	500	7	35	75	390	39060	-36078	92.5	4.3
Small	17144	100	13	13	15	72	7308	- 9836	136.7	8.3
Medium	47313	300	13	39	45	216	21924	-25389	117.5	7.3
Large	75952	500	6	30	75	395	39480	-36472	92.4	4.3

2. Commercial Feed

Representative	40931	200	8	16	30	154	23856	-17075	110.9	9.1
Best one-third	95938	500	7	35	75	390	39060	-56878	145.8	6.8
Small	21304	100	13	13	15	72	7308	-14996	208.3	12.6
Medium	59793	300	13	39	45	216	21924	-37869	175.3	10.9
Large	94752	500	6	30	75	395	39480	-57272	145.0	6.8

1/ Assumed to be 15 percent of the point-of-lay flock.

2/ Assuming that culls and hens sold at end of laying period fetch 84 d. each.

Calculated by the author from data collected in farm surveys.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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insignificant. For small and medium producers using RIR stock and commercial feed the per dozen cost is very visible (15 and 13 pence respectively).

The cost of labor appears to vary considerably among groups (Table 7-6a and 7-6b). On small operations, using RIR, it is ten times greater per dozen eggs than on the best-third operations. These variations follow from the comparative staff-flock size ratios, which point will be developed later in the chapter.

The incremental costs of production summed give the total variable cost of production (Table 7-7a and 7-7b). These calculations make the importance of feed as a component of total cost and relative importance of subsized feed apparent. It is the largest single cost component in every classification.

Share of Feed in the Total Variable
Cost of Production of Eggs*

	MOA Feed		Pfizer Feed	
	RIR	Hybrid	RIR	Hybrid
Representative	79%	55%	74%	70%
Best one-third	90	70	77	69
Small	71	67	70	70
Medium	80	71	75	73
Large	90	76	86	76

* Calculated from Table 7-7a and 7-7b.

2/ In this table the gross margin is calculated by deducting 46 d. from the TVC. This TR figure represents the typical cost per dozen eggs in Eastern Nigeria.

Table 7-6a

Cost of Labor for a Synthetic Flock of RIR - Per Dozen Eggs

Flock Type	No. of hired persons	Total annual wage bill to enterprise for hired labor	No. of Flocks	Size of Flock	Cost of hired labor per flock	Cost per hen	Cost per doz. Eggs
Representative	2	£ 96	1	2	130	7680 d.	59 d. 4.9 d.
Best-one-third	1	48	2	1	340	3840	11 0.8
Small	1	48	1	1	53	5760	109 9.8
Medium	2	96	2	1	159	7680	48 4.5
Large	3	144	4	2	355	5760	16 1.1

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Table 7-6b

Cost of Labor for a Synthetic Flock of Hybrid - Per Dozen Eggs

Flock Type	No. of hired persons	Total annual wage bill to enterprise for hired labor	No. of Flocks	Size of Flock	Cost of hired labor per flock	Cost per hen	Cost per doz. Eggs
Representative	2	£ 96	2	1	154	7680 d.	50 d. 2.8 d.
Best-one-third	1	48	2	1	390	3840	9.8 0.5
Small	1	48	1	1	72	5760	80 4.8
Medium	2	96	2	1	216	7680	35 2.2
Large	3	144	4	2	395	5760	15 0.7

Calculated by the author from data collected in farm surveys.

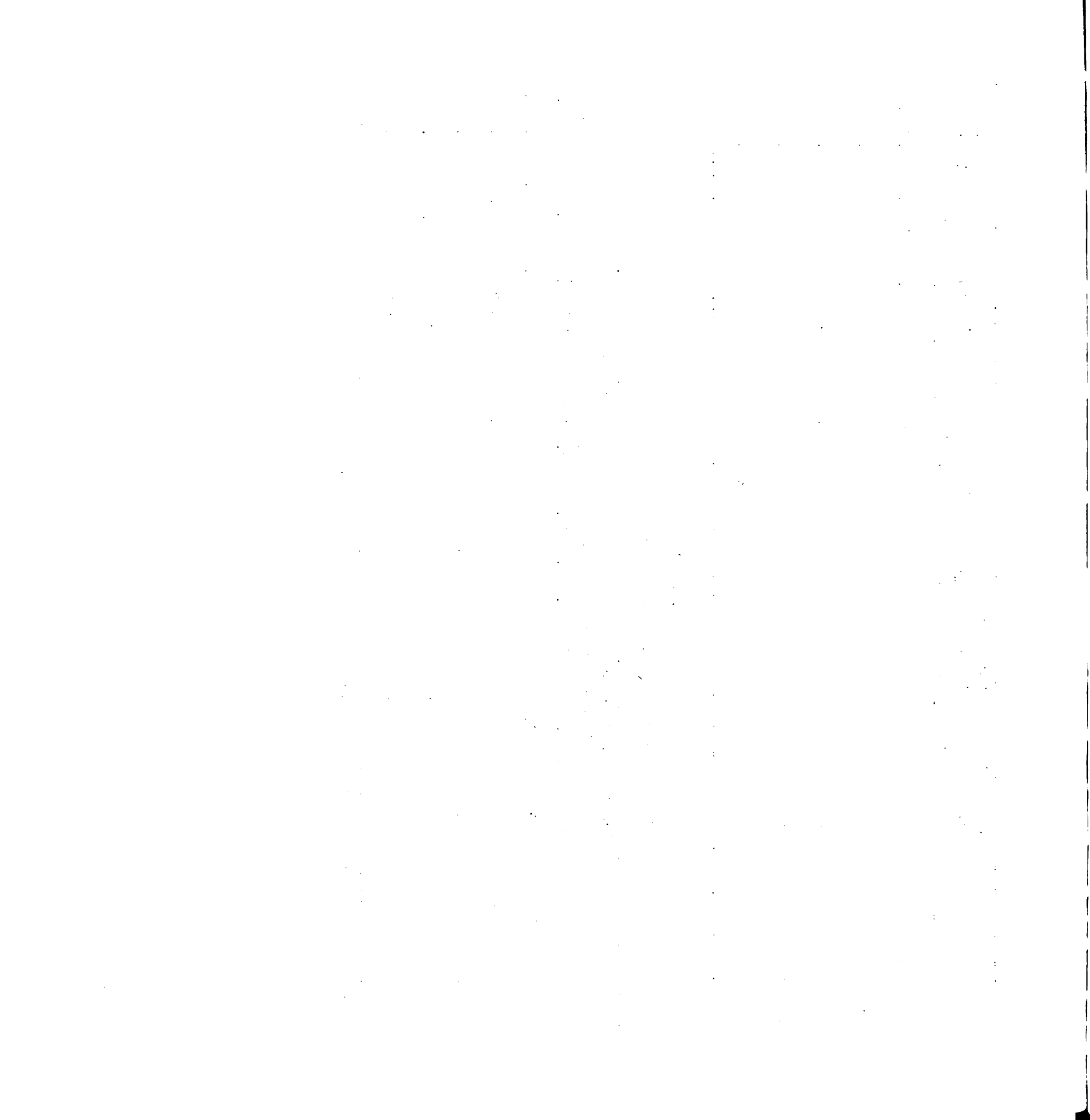


Table 7-7a

Cost of Production per dozen eggs for Synthetic RIR Flock on
MOA and Commercial Feed
(in pence)

1. MOA Feed	Hen					If TR per dozen is 46d.	
	Flock Type	depreciation	Feed	Labor	Other*	TVC	the gross margin will be:
	Representative	1.9	28.2	4.9	1	36.0	+ 10.0
	Best-one-third	-	18.2	0.8	1	20.0	+ 26.0
	Small	6.2	42.2	9.8	1	59.2	- 13.2
	Medium	3.8	38.4	4.5	1	47.7	+ 1.7
	Large	0.8	28.8	1.1	1	31.1	+ 15.9
2. Commercial Feed							
	Representative	9.0	42.2	4.9	1	57.1	- 11.1
	Best-one-third	5.8	27.4	0.8	1	35.0	+ 11.0
	Small	15.2	63.5	9.8	1	89.5	- 43.5
	Medium	13.3	57.6	4.5	1	76.4	- 30.4
	Large	5.5	43.2	1.1	1	50.8	- 4.8

* including maintenance, repair, litter, etc.

Calculated by the author from data collected in farm surveys.

Table 7-7b

Cost of Production per dozen eggs for Synthetic Hybrid Flock
on MOA and Commercial Feed
(in pence)

1. MOA Feed							If TR per dozen is 46d. the gross margin will be:
Flock Type	Hen depreciaton	Feed	Labor	Other*	TVC		
Representative	12.7	18.9	2.8	.7	35.1	+ 10.9	
Best-one-third	4.3	12.2	0.5	.7	17.7	+ 28.3	
Small	8.3	28.2	4.8	.7	42.0	+ 4.0	
Medium	7.3	25.6	2.2	.7	35.8	+ 10.2	
Large	4.3	19.2	0.7	.7	24.9	+ 21.1	
2. Commercial Feed							
Representative	9.1	28.3	2.8	.7	40.9	+ 5.1	
Best-one-third	6.8	18.2	0.5	.7	26.2	+ 19.8	
Small	12.6	42.2	4.8	.7	60.3	- 14.3	
Medium	10.9	38.4	2.2	.7	52.2	- 6.2	
Large	6.8	28.8	0.7	.7	37.0	+ 9.0	

* including maintenance, repair, litter, etc.

Calculated by the author from data collected in farm surveys.

The absolute share of total cost by feed is the function of several factors which operate to push it up and down. Efficient use of labor, use of sexed stock, wasteful use of feed or poor feeding methods, and larger flocks raise the share of feed in total cost. Use of hybrid stock and efficient use of feed act to reduce the proportional importance of feed. High rearing costs are typical of smaller operations with their comparatively inefficient use of labor seem to account for the lower feed cost figures of these classifications. On U.S. operations, as noted in the previous chapter, a high feed share of TVC is viewed as indicative of efficient use of other inputs, feed being the cheapest input to commercial egg production. The ratio seems a good indicator in Nigeria as well.

The actual gross margins for the studied groups are obtained on a per province basis by deducting the total variable costs of each classification from the total revenue per dozen prevailing in each province (Table 7-8a and 7-8b). Positive gross margins are obtained in most of the studied classifications except on small farms where RIR are used or where hybrid flocks are fed Pfizer feed. Hybrid on Pfizer is the highest cost combination found. RIR on Pfizer yield negative gross margins in every case except on best one-third farms. The importance of the subsidized feed is clear; negative gross margins are obtained only on small farms with RIR stock. Where MOA is fed to higher producing stock no negative margins are found and only one break-even occurs.

Table 7-8a

Gross Margins for Synthetic RIR Flocks Fed on MOA and
Commercial Feed in Six Markets of
Eastern Nigeria
(in pence)

1. MOA Feed

Flock Type	Province					
	Abakaliki	Enugu	Onitsha	Owerri	Port Harcourt	Umuahia
Representative	+ 6	+ 7	+ 10	+ 10	+ 17	+ 17
Best-one-third	+ 22	+ 22	+ 26	+ 26	+ 33	+ 33
Small	- 17.2	- 16.2	- 13.2	- 13.2	- 6.2	- 6.2
Medium	- 5.7	- 4.7	+ 1.7	+ 1.7	+ 5.3	+ 5.3
Large	+ 10.9	+ 11.9	+ 14.9	+ 14.9	+ 21.9	+ 21.9

2. Commercial Feed

Representative	- 15.1	- 14.1	- 11.1	- 11.1	- 4.1	- 4.1
Best-one-third	+ 7	+ 8	+ 11.0	+ 11.0	+ 18	+ 18
Small	- 47.5	- 46.5	- 43.5	- 43.5	- 36.5	- 36.5
Medium	- 34.4	- 33.4	- 30.4	- 30.4	- 23.4	- 23.4
Large	- 8.8	- 7.8	- 4.8	- 4.8	+ 2.2	- 2.2

Calculated by the author from data collected in farm surveys.

Table 7-8b

Gross Margins for Synthetic Hybrid Flocks Fed on MOA and
Commercial Feed in Six Markets of Eastern Nigeria
(in pence)

1. MOA Feed	Province					
	Flock Type	Abakaliki	Enugu	Onitsha	Owerri	Port Harcourt
						Umuahia
	Representative	+ 6.9	+ 7.9	+ 10.9	+ 10.9	+ 17.9
	Best-one-third	+ 24.3	+ 25.3	+ 28.3	+ 28.3	+ 35.3
	Small	-	+ 1	+ 4	+ 4	+ 11
	Medium	+ 6.2	+ 7.2	+ 10.2	+ 10.2	+ 17.2
	Large	+ 17.1	+ 18.1	+ 21.1	+ 21.1	+ 28.1
2. Commercial Feed						
	Representative	+ 1.1	+ 2.1	+ 5.1	+ 5.1	+ 12.1
	Best-one-third	+ 15.8	+ 16.8	+ 19.8	+ 19.8	+ 26.8
	Small	- 18.3	- 17.3	- 14.3	- 14.3	- 7.3
	Medium	- 10.2	- 9.2	- 6.2	- 6.2	- 0.8
	Large	+ 5.0	+ 6.0	+ 9.0	+ 9.0	+ 16.0
Calculated by the author from data collected in farm surveys.						

The pattern of synthetic enterprises which do and do not cover their variable costs, reflected by their gross margins, is presented in Table 7-9a and 7-9b. This table illustrates the short-run weakness of the smaller commercial egg concerns and once again the importance of subsidized feed to the survival of these firms.

When this pattern of short-run profitability is compared with the distribution of farm sizes in the six provinces (Table 7-10), a rather stern picture emerges. Of the total poultry farms in the region, some two-thirds are small, a quarter large and a twelfth of medium size. As only some 30 percent of all the stock in the Eastern Region is hybrid (and mainly on the larger farms) it must be assumed that most of the farms in the other groups use RIR. The farms in Abakaliki, Enugu and Onitsha typically use MOA feed; Owerri is mixed, and the other two provinces normally consume Pfizer. Hence, most of the small and medium farms in the latter provinces cannot survive in the short-run due to their stock type and 70 percent of the small producers in the region and 60 percent of the medium are located in these provinces! Altogether, a third of the total producers in the region, for reasons of stock and lack of subsidized feed, are not viable as commercial operations in the short-run. When it is recalled that small farms with MOA-fed RIR, typically do not break-even, the position of such farms in all provinces, which represent 75 percent of the total productive units, is doubtful. It seems likely, under

Table 7-9a

Synthetic Enterprise Types which have Positive Gross Margins;
Summed from Tables 7-8a
and 7-8b

Flock Type	MOA		Pfizer		Total with positive Gross Margin
	RIR	Hybrid	RIR	Hybrid	
Representative	6	6	-	6	18
Best-one-third	6	6	6	6	24
Small	-	5+1*	-	-	6
Medium	4	6	-	2	12
Large	6	6	2	6	20

* One breakeven operation.

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Table 7-9b

Synthetic Enterprise Types which have Negative Gross Margins

Flock Type	MOA		Pfizer		Total with negative Gross Margin
	RIR	Hybrid	RIR	Hybrid	
Representative	-	-	6	-	6
Best-one-third	-	-	-	-	-
Small	6	-	6	6	18
Medium	2	-	6	4	12
Large	-	-	4	-	4

Calculated by the author from data collected in farm surveys.

Table 7-10
Proportion of Farms falling into each Scale Classification
in Studied Provinces

Province	Small %	Medium %	Large %	Total %
Abakaliki	60	22	18	100
Enugu	54	11	35	100
Onitsha	58	15	27	100
Owerri	63	17	20	100
Port Harcourt	56	18	26	100
Umuahia	70	15	15	100
Total	60	17	23	100

Calculated by the author from MOA records, with data prepared from the farm surveys.

the circumstances revealed in Tables 7-9 and 7-10, that no more than a third of the firms operating in Eastern Nigeria earn positive gross margins. The remaining two-thirds would, if no changes occur in the economic or managerial variables confront a bleak future.

3. Calculation of Net Margins for the Studied Synthetic Enterprises

The appropriate deductions have been calculated for all the studied synthetic flocks and are outlined in tabular form: house depreciation (Table 7-11a and 7-11b); interest on capital invested (Table 7-12a and 7-12b); and the cost of family labor to the poultry enterprise (Table 7-13a and 7-13b). This latter deduction, however, is not entered in the final calculation of the net margin for the reasons outlined in the previous chapter. The total deductions to be made from the gross margins appear in summary form in Table 7-14a and 7-14b and the final net margins are presented for each flock in the six provinces in Table 7-15a and 7-15b.

The representative farm is little affected by the deductions accruing from fixed costs, however, small and medium farms are greatly affected especially those using commercial feed. When these additional farms are deducted from those having positive gross margins perhaps as few as a quarter of the commercial egg operations in Eastern Nigeria can be said to be profitable in the long-run, and these being mainly the largest best-sited firms (Table 7-16). Were subsidized feed to become unavailable

House Depreciation Cost for RIR Flocks (Assuming a 12 year life to the Poultry House)

Flock Type	Cost of Housing (£)	No. of flocks housed(12yrs)	Cost of Housing per flock	No. of layers per flock at the time of disposal	Cost per hen housed	Cost per doz. Eggs
Representative	£ 250	22	2727 d.	130	21.0 d.	1.7 d.
Best-one-third	250	16	3750	340	11.0	0.8
Small	100	16	1500	53	28.3	2.5
Medium	300	22	3273	159	20.6	1.9
Large	700	22	7636	355	21.5	1.5

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Table 7-11b

House Depreciation Cost for Hybrid Flocks (Assuming a 12 year life of the Poultry House)

Flock Type	Cost of Housing (£)	No. of flocks housed(12yrs)	Cost of Housing per flock	No. of layers per flock at the time of disposal	Cost per hen housed	Cost per doz. Eggs
Representative	£ 250	22	2727	154	17.7 d.	1.0 d.
Best-one-third	250	16	3750	390	9.6	0.4
Small	100	16	1500	72	20.8	1.3
Medium	300	22	3273	216	15.2	0.9
Large	700	22	7636	395	19.3	0.9

Calculated by the author from data collected in farm surveys.

Table 7-12a

Interest on Capital Invested in a RIR Poultry Flock (Assuming
a Rate of Interest of 10 Percent)

Flock Type	The value of interest on poultry house for 12 years (£)	Cost per doz. Eggs (3)	Half value of flock at point- of-lay	Cost per doz. Eggs (5)	Total interest on capital: col. (3) and (5) summed
Representative	£ 150	1.0 d.	£ 34.4	.2 d.	1.2 d.
Best-one-third	150	0.5	72.5	.2	.7
Small	60	1.5	19.5	.5	2.0
Medium	180	1.1	48.0	.3	1.4
Large	420	0.9	74.0	.2	1.1

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Table 7-12b

Interest on Capital Invested in a Hybrid Poultry Flock (Assuming
a Rate of Interest of 10 Percent)

Flock Type	The value of interest on poultry house for 12 years (£)	Cost per doz. Eggs (3)	Half value of flock at point- of-lay	Cost per doz. Eggs	Total interest on capital: col. (3) and (5) summed
Representative	£ 150	0.6 d.	£ 57.7	.2 d.	0.8 d.
Best-one-third	150	0.2	130.9	.2	0.4
Small	60	0.8	30.6	.4	1.2
Medium	180	0.5	83.2	.2	0.7
Large	420	0.5	132.6	.2	0.7

Calculated by the author from data collected in farm surveys.

Table 7-13a

Cost of Family Labor to Poultry Enterprises using RIR Stock

Flock Type	No. of family workers	Total annual wage bill	No. of Flocks	Cost per flock	Hens per flock	Cost per Hen	Cost per dozen Eggs
Representative	1	7200 d.	3	2400 d.	130	18.4 d.	1.5 d.
Best one-third	2	14400	3	4800	340	14.1	1.2
Small	1	7200	2	3600	53	68.0	6.1
Medium	2	14400	3	4800	159	30.0	2.8
Large	2	14400	6	2400	355	6.8	0.5

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Table 7-13b

Cost of Family Labor to Poultry Enterprises using Hybrid Stock

Representative	1	7200	3	2400	154	15.5	0.9
Best one-third	2	14400	3	4800	390	12.3	0.6
Small	1	7200	2	3600	72	50.0	3.0
Medium	2	14400	3	4800	216	22.2	1.4
Large	2	14400	6	2400	395	6.0	0.3

Calculated by the author from data collected in farm surveys.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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Table 7-14a

Total Deduction from Gross Margins for Studied RIR
Operations

(in pence)

Flock Type	Cost of House depreciation	Interest on Capital Invested in		Total deduction from gross Margin
		House	Flock	
Representative	1.7	1.0	0.2	2.9
Best one-third	0.8	0.5	0.2	1.5
Small	2.5	1.5	0.5	4.5
Medium	1.9	1.1	0.3	3.3
Large	1.5	0.9	0.2	2.6

Table 7-14b

Total Deduction from Gross Margins for Studied
Hybrid Operations

Representatives	1.0	0.6	0.2	1.8
Best one-third	0.4	0.2	0.2	0.8
Small	1.3	0.8	0.4	2.5
Medium	0.9	0.5	0.2	1.6
Large	0.9	0.5	0.2	1.6

Calculated by the author from data collected in farm surveys.

Table 7-15a

Net Margins for Studied Synthetic RIR Flocks on MOA and
Commercial Feed
(in pence)

1. MOA Feed						
Flock Type	Abakaliki	Enugu	Onitsha	Owerri	Port Harcourt	Umuahia
Representative	+ 3.1	+ 4.1	+ 7.1	+ 7.1	+ 14.1	+ 14.1
Best one-third	+ 20.5	+ 21.5	+ 24.5	+ 24.5	+ 31.5	+ 31.5
Small	- 21.7	- 20.7	- 17.7	- 17.7	- 10.7	- 10.7
Medium	- 9.0	- 8.0	- 1.6	- 1.6	+ 2.0	+ 2.0
Large	+ 8.3	+ 9.3	+ 12.3	+ 12.3	+ 19.3	+ 19.3
2. Commercial Feed						
Representative	- 18.0	- 17.0	- 14.0	- 14.0	- 7.0	- 7.0
Best one-third	+ 5.5	+ 6.5	+ 9.5	+ 9.5	+ 16.5	+ 16.5
Small	- 52.0	- 51.0	- 48.0	- 48.0	- 41.0	- 41.0
Medium	- 37.7	- 36.7	- 33.7	- 33.7	- 26.7	- 26.7
Large	- 11.4	- 10.4	- 7.4	- 7.4	- 0.4	- 0.4

Calculated by the author from data collected in farm surveys.

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Table 7-15b

Net Margins for Studied Synthetic Hybrid Flocks Fed on MOA
and commercial Feed

(in pence)

1. MOA Feed						
Flock Type	Abakaliki	Enugu	Onitsha	Owerri	Port Harcourt	Umuahia
Representative	+ 5.1	+ 6.1	+ 9.1	+ 9.1	+ 16.1	+ 16.1
Best one-third	+ 23.5	+ 24.5	+ 27.5	+ 27.5	+ 34.5	+ 34.5
Small	- 2.5	- 1.5	+ 1.5	+ 1.5	+ 8.5	+ 8.5
Medium	+ 4.6	+ 5.6	+ 8.6	+ 8.6	+ 15.6	+ 15.6
Large	+ 15.5	+ 16.5	+ 19.5	+ 19.5	+ 26.5	+ 26.5
2. Commercial Feed						
Representative	- 0.7	+ 0.3	+ 3.3	+ 3.3	+ 10.3	+ 10.3
Best one-third	+ 15.0	+ 16.0	+ 19.0	+ 19.0	+ 26.0	+ 26.0
Small	- 20.8	- 19.8	- 16.8	- 16.8	- 9.8	- 9.8
Medium	- 11.8	- 10.8	- 7.8	- 7.8	- 0.8	- 0.8
Large	+ 3.4	+ 4.4	+ 7.4	+ 7.4	+ 14.4	+ 14.4

Calculated by the author from data collected in farm surveys.

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Table 7-16a

Synthetic Enterprises which have Positive Net Margins

Flock Type	MOA Subsidized Feed		Pfizer Feed		Total with Positive Net Margin
	RIR	Hybrid	RIR	Hybrid	
Representative	6	6	-	5	17
Best one-third	6	6	6	6	24
Small	-	4	-	-	4
Medium	2	6	-	-	8
Large	6	6	-	6	18

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Table 7-16b

Synthetic Enterprises which have Negative Net Margins

					Total with Negative Net Margin
Representative	-	-	6	1	7
Best one-third	-	-	-	-	-
Small	6	2	6	6	20
Medium	4	-	6	6	16
Large	-	-	6	-	6

Calculated from the preceding tables 7-15a and 7-15b.

this fraction would become yet smaller and the industry shrink to a few large farms located near Port Harcourt and Enugu.

4. Factors Affecting Farm Efficiency

In this section we shall consider only 'on-farm' factors affecting farm efficiency. The role of public policy as this related to farm operations will be left to Chapter 8. Each cost factor will be considered separately, beginning with feed.

A poultryman would logically use the cheapest feed available, in this case MOA. However, MOA is not available throughout the region, and its supply has been erratic, furthermore, some farmers feel its quality varies which together act to restrict a poultryman's freedom of choice. As a result the more costly commercial feed is fed on a large number of farms. The farmer can nevertheless influence his feed cost by good feeding practices. Such practices vary and could be generally improved. Many farmers do not adjust their levels of feeding as the flock ages, thus a flock can be both over and under fed during its laying life. Feeding equipment is often crude and wasteful of rations. Watering, which can have an important role in lay, is often neglected. Feed is spilled, attacked by rodents or otherwise wasted. Smaller farms, where poultry is often a minor or secondary enterprise, are especial sinners in these regards. More efficient feed use is an important and comparatively

simple matter to correct and one which, if corrected, could move many losing farms into the black.

A second vital area open to farmers to improve their operations is quality of stock. One of the easiest steps towards widening net margins would be to replace RIR with hybrid birds. This action alone would allow the typical small and medium farm to attain positive net margins using MOA feed so long as the price of eggs did not fall below 45 d. (.52¢). A hybrid hen typically produces five dozen more eggs over her laying life than does a RIR and requires about three pounds less feed per dozen to do it. The hybrid has a mortality of half that of RIR stock and can be purchased in sexed flocks, removing the worrisome problem of cockerels.

Lack of supply of hybrid birds seems to be one reason why farms have not adopted this type earlier; in very few cases does the extra cost per chick appear to have been a significant factor.

The cost of labor, very high comparatively on smaller farms, is another source of high costs which can be remedied by the operator. Smaller farms are especially inefficient in the use of their labor input. The small farm typically has one full-time hired man at the site while the middle size farm has two. The ratio of hired man to birds on litter indicates the considerable disparity between the small and large, the small and best one-third operations.

Ratio of Hired Men to Hens
on Litter *

<u>Farm Type</u>	<u>Hybrid</u>	<u>RIR</u>
Representative	1:300	1:400
Best one-third	1:2000	1:2500
Small	1:200	1:300
Medium	1:450	1:600
Large	1:1000	1:1333

* Calculated from Table 7-1.

This disparity in the efficiency with which labor is combined in the operation is also revealed in the comparative share of the labor charge in the total variable costs. On a small farm with MOA-fed RIR, labor costs 17 percent of the TVC, whereas it is 5 percent on the best one-third and 13 percent on the largest farms. For a small farm, with hybrids on MOA, the labor share is 12 percent versus 3 percent on the best one-third. On those farms using hybrids fed Pfizer feed, labor costs 8 percent of the total on small farms and 2 percent on the best one-third.

Two courses seem open to the small commercial unit in this circumstance. Increase the ratio of birds to labor; which is to say increase the size of farm. Or, replace hired labor with cheaper family labor. This last option may be more appealing in the abstract than in practice in that most farmers interviewed complained about the equal difficulty in getting family members to work or to fire them. Kinsmen were more often viewed as a burden to be borne than an asset. It is

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also likely that kinsmen take advantage of the difficult social situation in which the operator finds himself involved and do not seem particularly pressed to work for really quite low wages. Raising their wage brings up the other problem of increasing labor costs.

Reducing the labor force is feasible in many instances. A number of farms of all sizes were found to be overstaffed, although in many cases these represented a number of kinsmen rather than full-time hired persons. In the case of a small flock with a single man, the solution would be to use the man in other enterprises as well, or increase the number and size of flocks. A number of alternatives seem open with regard to this common problem.

Extravagant housing is another source of high production costs although a comparatively minor one on a cost-per-dozen basis. Many smaller farms are comparatively high cost operations with respect to their cost per hen

Cost per hen Housed for Studied Firms*

<u>Farm Type</u>	<u>Cost Per Hen (in pence)</u>
Representative	100
Best one-third	30
Small	120
Medium	93
Large	58

* Calculated from Table 7-11a and 7-11b.

housed. All the classes of farms studied could build cheaper housing than they are using. One small farm was found housing a 100 hens in a £ 9 house

1. The first part of the document is a letter from the President of the United States to the Congress, dated January 1, 1861. It is a very important document, as it sets out the policy of the new administration. The President states that he is committed to the principles of liberty and justice for all, and that he will work to maintain the Union. He also mentions the issue of slavery, which was a major point of contention at the time.

2. The second part of the document is a report from the Secretary of the Treasury, dated January 1, 1861. It provides a detailed account of the financial state of the country. The report mentions the national debt, which had increased significantly since the Civil War. It also discusses the state of the economy, which was struggling due to the war. The Secretary concludes by stating that the government will continue to work to improve the financial situation.

3. The third part of the document is a report from the Secretary of the Interior, dated January 1, 1861. It provides a detailed account of the state of the western territories. The report mentions the discovery of gold in California, which had led to a large influx of settlers. It also discusses the state of the Indian tribes, which were still a source of conflict. The Secretary concludes by stating that the government will continue to work to develop the western territories.

4. The fourth part of the document is a report from the Secretary of the Navy, dated January 1, 1861. It provides a detailed account of the state of the navy. The report mentions the construction of new ships, which was a major priority for the government. It also discusses the state of the fleet, which was still recovering from the Civil War. The Secretary concludes by stating that the government will continue to work to strengthen the navy.

5. The fifth part of the document is a report from the Secretary of the War, dated January 1, 1861. It provides a detailed account of the state of the army. The report mentions the construction of new forts, which was a major priority for the government. It also discusses the state of the troops, which were still recovering from the Civil War. The Secretary concludes by stating that the government will continue to work to strengthen the army.

(about 21 d. per hen housed); and in fact this farm was among the best one-third. Similarly, a large farm (not included in the cost of production survey) housed 500 birds in a £ 50 for 24 d. per hen housed. These houses were imaginatively constructed of local materials: mud, thatch and wire in the case of the smaller houses; cement blocks, wire and thatch in the larger. Cost of housing could have been cheaper on almost every farm included in the survey. Although such savings will not greatly affect the cost per unit of production, it could greatly affect the initial scale of operation possible to a farmer by allowing him to use money formerly earmarked to housing for an extra flock. (It costs £ 70 to bring a small hybrid flock to point-of-lay; and a typical house on a small farm was found to cost £ 100.)

Of a minor nature, it was found that almost all the farms visited had poorly designed, and an over abundance of, rather costly equipment. For example, some nests costing £ 3-5 were commonly seen, although much cheaper alternatives were available. Probably on no farm does this factor affect the net margin significantly, but it is one more economy possible to almost all poultrymen.

An important improvement of a more intangible nature must be a general upgrading of flock handling. Provision of ample water, awareness of vices, keeping the house cool, minimizing flock disturbances, effectively

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isolating flocks from each other and from outside birds are all management activities typically deficient. Better supervision of staff could reduce spillages and feed wastage, remove sick birds, keep water troughs filled.

Implicit in these steps outlined above is an additional one; the need by operators to become better managers. The most important single step available to poultrymen to improve their management is to adopt, master and utilize modern poultry record-keeping techniques. This need has been noted previously, but the point cannot be overstated. Good records, allowing the operator specific up-to-date information on the performance of each flock throughout its life is a necessity. However, on not a single farm of the 100 initially surveyed are such records kept!

As some or all of the above practices are adopted, farms can become more efficient and more profitable. At prevailing egg prices, farms of all studied scales could become economically viable enterprises in the long-run. We have seen that even small operations under conditions of good management can become as efficient as the best one-third and this without proper record keeping methods! Poor location is a constraint which cannot be completely offset by even excellent management, and might be ultimately fatal, but under economic conditions prevailing in Eastern Nigeria most poultry operations could become profitable enterprises with adjustments open to the individual farmer.

One important factor may act to keep many operations from improving. There is among an unknown number of farmers some indecision whether they are commercial operators or keepers of large backyard flocks which serve to earn a little extra to the farm. It will be recalled from Chapter 5 that nearly half of the studied poultrymen receive very little cash income from their flocks and that nearly forty percent did not view the enterprise as their most important work. These attitudes were not correlated with scale of holding but it seems safe to infer that these groups likely held smaller flocks and poorer grade stock as well. If this be the case (and recall 60 percent of the recorded farms are small) a substantial share of the total operations in Eastern Nigeria are not likely to improve due to indifference on the part of their owners.

This evaluation suggests that we may expect only half the poultry operations to significantly improve themselves from their own efforts and that these farms will more likely be larger than smaller in size; namely those in excess of 2-3 layer flocks comprising upwards of 600 layers.

This, as well as the economics of poultry farming developed in this chapter strongly suggests that the direction of the industry will be towards larger operations. Many farms are presently surviving on subsidized feed and/or living on their invested capital. The pattern in many cases is high overhead, low levels of output, high mortality, poor

use of feed and poor location. Yet upwards of a hundred farms are operated as serious commercial ventures, in many cases with high levels of output, good feed use and near good markets.

5. Summary

An analysis of 33 flocks on 21 farms in Eastern Nigeria indicates that farms of all sizes can produce positive net margins under prices for inputs and product presently existing in the region. Nevertheless, smaller and medium size farms (less than 600 layers) are often unprofitable (being over staffed, over-invested in housing and more often than not poorly managed. Many farms of (all scales) are poorly sited as well.

Better management, use of high quality stock, good feeding methods could make smaller farms sufficiently efficient to provide the margin necessary for survival and growth. Needed changes in practices by poultrymen of all scales but especially the smaller can be summed up as follows in descending order of importance:

1. Shift to hybrid egg-specialist stock.
2. Take steps necessary to improve efficiency of feed use:
including use of farm records, careful supervision of
feed use, provision of ample water.
3. More efficient use of labor; by either reducing staff or
increasing the size of operation with respect to the
existing staff.

4. More careful training and supervision of staff; this would lead to better flock handling which would reduce mortality, vices, feed wastage, etc.
5. Better house design and cheaper housing.

Whereas better practices are immediately open to poultrymen to autonomously improve themselves, the tendency by a large number of poultrymen is to view their operations as only semi-commercial which suggests that in many cases improvements will not be made. The thrust of the industry is therefore towards larger operations clustered about the larger towns. But this trend will be slowed so long as subsidized feed remains available and egg prices remain near 4/- per dozen.

Were good or better practices to be adopted on the farms, the ensuing savings from increased margins would likely lead to a gradual increase in the size of operations if these margins were reinvested in the enterprise.

With hybrid stock, subsidized feed and present egg prices and good management, farms of all scales could continue to operate and prosper in most sites in Eastern Nigeria. Were egg prices to decline much below 3/9 (.52¢) per dozen the economic conditions of many farms would become critical.

CHAPTER 8

ECONOMIC CONSIDERATIONS AND ALTERNATIVES OPEN TO PUBLIC POLICY

"Two men look out through the same bars;
one sees the mud, and one the stars".

F. Langbridge
A Cluster of Quiet Thoughts

1. Introduction

This chapter will view the commercial egg industry from the standpoint of public policy, and will deal with those opportunities open to government, off-farm, to help poultry farms and the commercial egg industry. Following a brief review of the assumptions made by the public sector regarding their initial policy, the variables relevant to the supply and demand curves associated with the egg industry will be examined. Some of the alternatives open to public policy will be discussed and finally a specific policy proposal, based on this analysis, will be presented.

2. Public Policy and the Commercial Egg Industry

The commercial egg industry of Eastern Nigeria was conceived and initiated as a means to produce a cheap protein-rich food by what was expected to become an economically viable industry. Planners

adopted the strategy of subsidizing the major cost items in commercial egg production (feed and chicks) to reduce risk, and the costs of entry and to increase the rate of return to poultrymen, during the learning period (when presumably they could be earning a higher rate of return in some alternative investment).

This strategy, and thus ultimately the industry, rested upon several assumptions. First, a large potential market did exist which would be tapped as egg prices fell. In this regard it was presumed that the lower prices would act to offset the low absolute money incomes earned by most urban Nigerians in sufficient degree to allow them to become steady consumers of the product. Second, the provision of subsidized inputs would stimulate the supply of eggs in three ways. First, by attracting entrepreneurs. Second, making the enterprise remunerative even to relatively inexperienced managers. Third, as farmers mastered the technology, and consequently improved their management of it, the costs of production would fall sufficiently that subsidies could be withdrawn (even when egg prices became low'), and still have enough poultrymen survive to produce the needed number of eggs, economically.

The extent to which these assumptions have been justified has been tested by the subsequent history of the scheme. On some counts the venture has been a success: imported eggs quickly vanished (Table 8-1); egg prices fell to half their 1959-60 level; substantial local production

Table 8-1

Imports of Eggs (in Shell or Otherwise) into Nigeria 1954-1965

Year	Value of Imports	Yearly Values as % of 1960
1954	21, 715	17
1955	36, 231	29
1956	47, 026	38
1957	49, 013	39
1958	71, 789	57
1959	96, 991	77
1960	125, 379	100
1961	120, 761	96
1962	48, 509	39
1963	5, 781	5
1964	2, 744	2
1965 (Jan-Sept)	2, 629	2

Prepared and compiled by Uno Udosen, Director, Enugu Office, Federal Office of Statistics.

has been achieved. Yet the proportion of urban persons who consume eggs frequently enough to be of some nutritional benefits remains small with little likelihood of widening until commercial eggs reach a price not too far above Guinea fowl eggs (which sell at 2 d. each or 24 d. per dozen)^{1/}. The reasons for this have been examined in Chapter 4. Moreover, even with subsidized inputs and, (more recently), supported egg prices as well, many producers (as we have seen in Chapter 7) are unlikely to remain in operation unless they can markedly improve their levels of management. In this context several alternative policies are open to government planners; to pursue the program with its present nutritional objectives; seek alternative and perhaps more modest objectives; or to withdraw public participation.

Government can, by policy measures, influence the economic environment in which farms operate. To estimate how and in what manner policy can influence producers and the industry, it is useful to consider the basic variables operative in the commercial egg industry. These variables express themselves through the supply and demand curves for commercial eggs, each having a distinctive but unmeasured slope, which cause egg prices to vary in a particular manner as the relative importance of the variables change. The slope of the curves will vary through time as well. In the case of the supply curve the slope will

^{1/} This is probably too stiff a test for a not completely equivalent product. But a 3 d. egg (36 d. per day) seems a feasible objective.

depend upon factors affecting the cost of production of eggs and their distribution to consumers. Its absolute position, with regard to price quantity supplied, will be a function of rate of entry and exit, expansion or contraction of flock sizes, and technology. The price and availability of feed; price, supply and varieties of chicks; quality and reliability of veterinary support; quality of management and marketing arrangements will all affect egg supply. The short-run supply should be fairly inelastic as egg production needs time to be significantly varied.

In the case of demand for eggs, family income, tastes, alternative foods, numbers and location of retail outlets will play a role. A case has been made (in Chapter 4) for a rather inelastic demand curve for eggs, especially at prices greater than 2 d. per egg. This deduction was based in part on family buying habits, levels of income and the experience of the nearest substitute - the Guinea fowl eggs. The consumer survey suggests that prices can fall from their present level of about 4/- to 4/6 per dozen (depending upon location) to 3/- and still only reach a rather narrow wedge of the urban market. Below 3/- (.42¢) the majority of the urban public can begin to afford to become regular consumers of eggs. Aside from subsidizing the price of eggs to consumers, few policies open to government can appreciably affect the level of consumption. Until prices are reduced, substantially promotional campaigns can have only a very limited impact.

Public policy can more easily affect the supply of eggs, and thus their final price. Although very short-run changes in supply can be accomplished by farmers through on-farm adjustments in flock size and number of flocks, hen type, certain cost-cutting acts and generally more efficient management, government can affect all these indirectly. It can influence on-farm decisions fairly quickly by changes in feed subsidy, improvements in egg marketing and input supply arrangements, and by providing better hen stock or selling chicks at concessional prices. Policy can have a more gradual effect through the extension service and by farm credit programs. Price supports for eggs are likely to have some short-term impact but a much stronger influence over the longer-term as consequent decisions are made regarding size of operations. The supply curve is more amenable to (and in fact has been the loci of) public policy, which has largely accepted the demand curve as given. Given the rather steep slopes associated with these curves, egg price fluctuations can be, and have been, considerable and most fluctuations have emanated from shifts in the supply side against a more stable demand curve.

A final comment must be made before considering policy possibilities. It is important to recall that the typical poultryman is not a subsistence farmer in any sense of the term. These farmers are largely urban persons with close rural links but who are nonetheless highly visible and often respected members of the rural community and who may also

be viewed as trend setters by example to their rural neighbors. They are market-oriented in their activities and have learned poultry technology in a comparatively modern environment. These are decision-makers who have responded in a rational manner to economic stimuli. Poultrymen have shown themselves to be constantly adopting from experience and refashioning their technical organization and management to minimize costs. They enter, expand, decline or exit depending upon their ability to judge economic conditions as these interact with technical and locational factors. There is every reason to believe that poultry husbandry-men and the egg industry is responsive to public policy.

3. Public Objectives Reconsidered

Policy is applied with a particular objective in view, and to be effective the objective should be specified in quantitative terms in some time reference. The government of Eastern Nigeria has been vague in regard to the time when these were to be achieved. However the regional objective remains: an egg per urban person per week (in the indefinite future)!

At the present rate of production there are about eight eggs per urban person available annually and, due to price, most of the consumption occurs among the higher income groups. How much extra effort is needed to meet the goal is suggested by the size of the potential consuming public compared with the present scale of the industry. In 1963-64, there were

an estimated 3,700,000 urban persons in the region who, at the targeted consumption rate, could consume over sixteen million eggs annually. This production would require nearly a million hybrid hens consuming 40,000 short tons of feed annually! The reality is a little over 100,000 hens, consuming less than 10,000 tons of feed (itself in short supply) to produce about two million dozen eggs.

Given a discrepancy of this magnitude it is altogether doubtful whether the regional government will be prepared to take the policy measures necessary to close the gap. In this light the question must be raised, what can the public be expected to do for some 350 poultrymen in a region comprising nearly 12,000,000 persons and confronted with a hundred other claims on resources which could benefit more persons sooner? What should government do?

First, the public objective must be restated and second, the necessary implementing policies worked out. What realistic objectives are open to the industry within the constraints imposed by the government's decreased willingness to continue to support the industry?

Let us first consider these farms which are able to produce the cheapest eggs (Table 8-2). If we assume that a cheap egg is anything less than 3/6 or 42 d. per dozen (3.5 d. per egg) then a reasonably hopeful future can exist for many farms, so long as subsidized feed is available. Farms with average managerial competence can produce

Table 8-2a

Total Cost of Production Per Egg and Per Dozen Eggs on
Farms Capable of Producing at less than 3/6 per doz.
(in pence)

1. Subsidized Feed

Flock Type	RIR		Hybrid	
	Cost per doz.	Cost per Egg	Cost per doz.	Cost per Egg
Representative	38.9	3.2	36.9	3.1
Best-one-third	21.5	1.8	18.5	1.5
Small	-	-	-	-
Medium	-	-	37.4	3.1
Large	33.7	2.8	26.5	2.2

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Table 8-2b

Total Cost of Production Per Egg and Per Dozen Eggs on
farms Capable of Producing at less than 3/6 per doz.

2. Commercial Feed

Flock Type	RIR		Hybrid	
	Cost per doz.	Cost per Egg	Cost per doz.	Cost per Egg
Representative	-	-	-	-
Best-one-third	36.5	3.0	27.0	2.2
Small	-	-	-	-
Medium	-	-	-	-
Large	-	-	38.6	3.2

Calculated from Tables 7-7a and 7-7b and 7-14a and 7-14b.

such eggs, even with RIR stock. Nevertheless, the importance of hybrid stock is apparent (Table 8-2a) and especially scale. These two factors become even more important in the absence of subsidized feed (Table 8-2b).

The Best one-third farms, let it be recalled, typically have 1500 hens on litter, plus 500 pullets. They hire one man in addition to the owner-operator, whereas the otherwise comparable large farm has three hired men. The large farm has 500 more hens and 500 more pullets than the Best one-third. Both types use feed efficiently, get high production per hen and have low mortality levels. Most Best one-third farms are large.

Given the presence of a body of efficient producers, and given that the original nutritional objective is beyond the financial and political means now available to the industry what should public policy be? ^{2/} The above figures indicate that producers of all scales of production analyzed in Chapters 6-7 and especially those with good management, can produce far more cheaply than is typical.

^{2/} One consideration must be kept in mind by planners, however. The figures appearing in Table 8-2 do not include distribution costs from producer to consumer nor do they include the opportunity cost to producers. It is not clear that an egg producer could equal the profit possible from alternative opportunities while producing eggs from 1/6 d. to 3.5 each. The comparative rates of return from alternative enterprises - cocoa, oil palm, pineapple, etc. are not available, but this is a considerable of which the entrepreneur would take into account.

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If comparatively cheap eggs are possible under conditions presently prevailing in Eastern Nigeria, and given both the considerable public investment already made and the consumers evident liking for eggs, if cheaply priced, it would seem the best policy to work with the industry, make it more efficient while reducing the level of public financial involvement. This will be the policy line recommended by this thesis.

Why not some other alternative? Why not drop the scheme, withdraw public support from what is admittedly a small number of operators employing a small number of workers producing at present a product reaching only the well-to-do?

a. If No Change Occurred in Public Policy?

If present policies were continued it seems clear (from the analysis in Chapter 7) that the original nutritional objective would remain unfulfilled for a long time to come. The number of producers would eventually dwindle until as few as a third or even a quarter of the present number remained, largely clustered about Port Harcourt and Enugu-Onitsha. There would certainly be a tendency toward larger producers, but under the umbrella of subsidies a number of not very efficient producers could continue for an indefinite period living on their capital. The remaining large producers would likely expand production somewhat, as dictated by their individual economies of scale. Eggs accordingly would become available to a progressively wider market, as prices fell. The size of

holdings would very likely increase up to the limit permitted by feed supplies. Were the regional government prepared to compound up to 40,000 tons of feed annually and support its low price for MOA feed, the nutritional target could be fulfilled, but at a considerable cost and by perhaps no more than 100 producers in the very indefinite future. But we have seen that this is an unlikely eventuality.

b. Withdrawal from the Industry

Of the alternative policies open to the government most involve some form of disengagement. The most straight-forward would have been to drop the scheme entirely, withdraw support, leaving poultrymen to fend for themselves. Some egg producers, Pfizer, and some hatcheries could survive such a decision which would result in a very small industry comprised of a few very large efficient producers selling eggs above 3/- per dozen to the main markets. There are, however, moral and practical (to say nothing of political) difficulties in such a decision.

By encouraging private persons to invest in the scheme government assumed a moral responsibility, implicitly assuring poultrymen by its act of sponsorship that it would not drop the scheme abruptly. Practically, government has a real interest in not setting such a precedent. Future schemes will also require participation by private persons. Government needs the trust of potential entrepreneurs before they will cooperate in development programs, but trust must be well-founded. A precipitate

termination of a program, even a loser, will not build such trust. If the poultry industry is to be dropped, it is in the public interest to phase a withdrawal. In such a circumstance it would be best to candidly concede that initial hopes proved unfounded and that prospects do not seem sufficiently hopeful to justify further promotion. But that in the interest of those who participated public withdrawal will be slow enough to allow poultrymen time to retrench.

4. The Policy Proposed by this Study

This study recognizes that government is unlikely to continue the present policy with regard to the commercial industry. It proposes, as an alternative, a phased withdrawal designed as to the support some portion of the industry that a considerable public investment has already brought into being. This position is argued on two counts. First, to maintain popular confidence in future public programs. Second, to protect those entrepreneurs who have invested and who appear able to succeed both as poultrymen and as agents in more general rural development. To accomplish this objective the following policy seems feasible:

- i. to take steps through the extension service and agricultural university to improve the quality of poultry management.
- ii. to encourage expansion of the supply of hybrid stock.
- iii. to continue the veterinary support program, but as a service paid for by the users.
- iv. to withdraw the feed subsidy by a given date, say two years,

after (i) and (ii) above are initiated, and established.

By phasing the withdrawal, the government would simultaneously show responsibility toward the industry it brought into being and give time and the means to producers to learn to operate their farms as agro-businesses. The inefficient poorly located producers would be squeezed out. The proposed scheme would involve a considerable restructuring (and retraining) of the extension service. The service would have to teach agro-business and demonstrate and guide the use of modern record-keeping and flock management.

The preparation of farm business materials and follow-up research into their use would afford an opportunity for closer university-extension service cooperation. A continuous feed-back, analysis, and shift in extension services resulting from a clearer idea of farmer needs would result from this sort of cooperation and would be fruitful preparation for similar services to other farm enterprises as well.

Publically-supported credit could be linked to the use of farm records, and perhaps include more direct supervision of farm management. This would involve closer cooperation between extension, credit and university staff, permitting scope for feed-back among government, farmers and research groups supporting farm development.

The government hatchery at Abakaliki should cease to produce and distribute RIR stock. So long as it remains in this activity (and the

regional government has said this is "temporary") it should produce sexed hybrid egg-specialist stock. Private hatcheries would follow such initiatives and indeed will anticipate it.

There seems no good reason why commercial farms should not pay for inoculation of their stock. The service could be made more efficient by increasing the number of staff giving service to the flocks by reducing the presently high formal qualifications required of these persons.

Once these three steps were undertaken the MOA could announce that feed subsidies would terminate in a given period; a sufficient period for the alert producer to master better practices, get better stock, and prepare himself to be completely independent of off-farm support for his cost structure.

This longer-term approach would quite possibly permit from half to two-thirds of the present number of producers in the industry to remain. Total egg production would likely increase and egg prices could fall to within the 3/- (.42¢) per dozen range.

5. Summary

Despite a substantial public investment in the commercial egg scheme on the part of the Eastern region government since 1960-61; the industry has failed to accomplish its purpose: sufficient production

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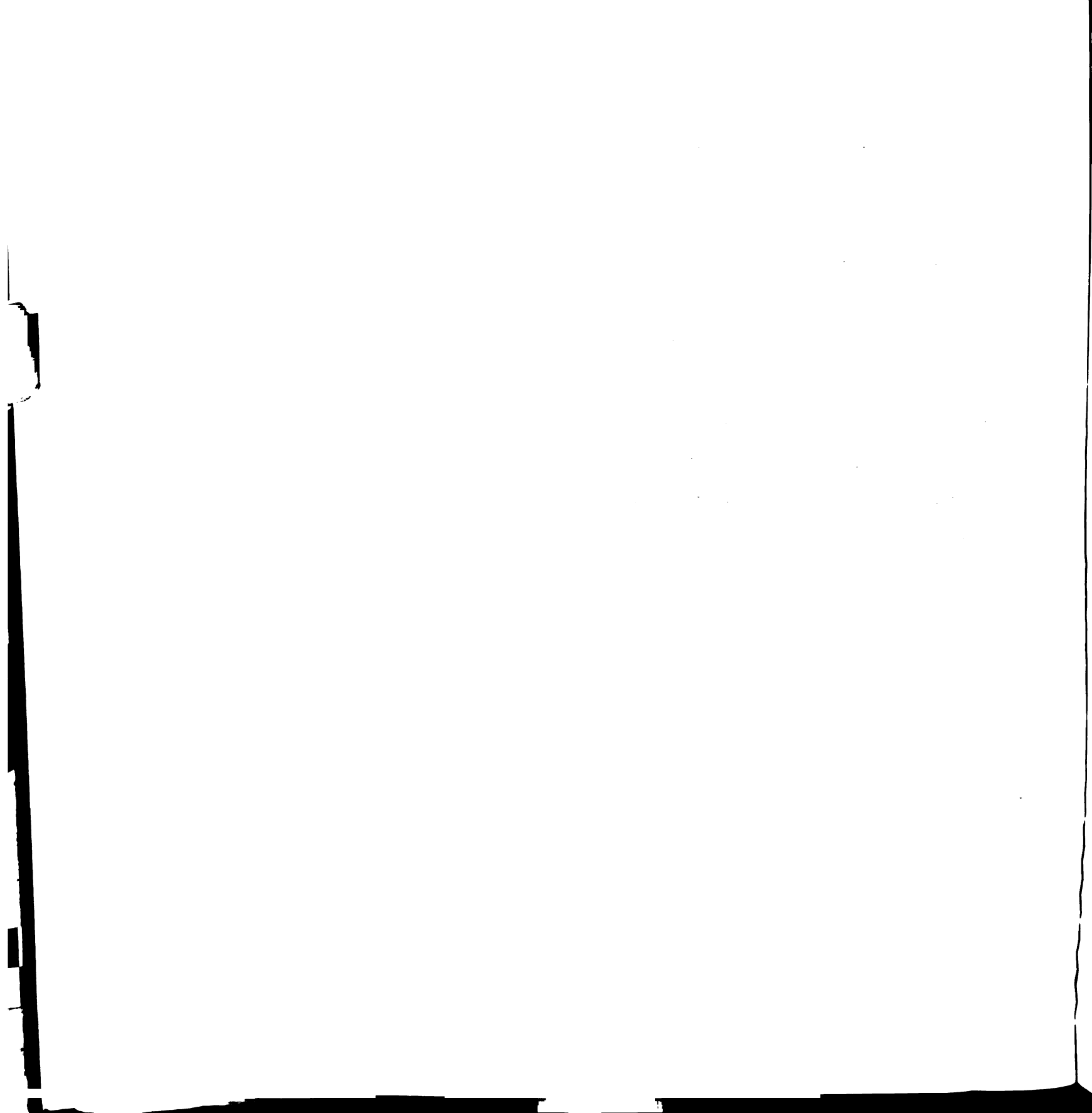
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to supply one egg per urban person weekly at a reasonable price. This failure stems in part from epidemics, feed shortages and distributional weaknesses, but primarily it rests upon two related factors. First, the low absolute incomes in the urban areas require that prices approach 3/- per dozen to reach the desired market. This price is too low to be economically feasible to most egg producers. Second, poor management keeps most producers from being able to produce efficiently enough to reach the mass market: Many of those who are sufficiently efficient, do so with subsidized feed. The regional government is unwilling to take those steps necessary to subsidize the industry to the fulfillment of its nutritional goal.

The analysis performed in this thesis suggests the following policy. The thesis recommends a phased withdrawal of the MOA, but one designed in such a way to protect insofar as possible the public investment in the industry and public confidence in future agricultural development schemes. Prior to the termination of subsidized feeds the following steps are recommended. First, hybrid stock be made available on a large scale. Second, the extension service in cooperation with the land-grant university develop and make available suitable farm management materials, assist in the training of poultrymen in their use and interpretation. Third, end the subsidized feed supplies at some date sufficiently in the future (say two years) that serious poultrymen have a chance to digest the first

three changes. Thereafter the MOA should let the chips fall where they may as regards individual producer survivability.

This scheme would give reason to expect about a third of the present producers to survive, these being the larger, the better managed and the best located. As the economies of commercial egg production argue for increased scale it would be reasonable to expect a slowly growing egg supply (in excess of that presently produced by 350 operations) and falling egg prices. With good management a very large number of the remaining producers should be able to approach a 3/- per dozen price. This will not satisfy the regional objective but will provide a solid foundation from which to expand urban incomes rise.



CHAPTER 9

SUMMARY AND CONCLUSIONS

"For youth, the future is long the past is short
... it is easily deceived because it is quick
to hope".

Aristotle

1. Summary

The objectives of this thesis were to analyze the economics of the commercial egg industry of Eastern Nigeria and to make public policy recommendations for the industry before the Nigerian-Biafran civil war started in July 1967.

The commercial egg scheme was primarily conceived by the Government in Eastern Nigeria in the early 1960's as an investment in social welfare under the assumption that the protein shortage in Eastern Nigeria could be efficiently supplied by modern poultry technology. The goal of one egg per week for every urban consumer was implied in Eastern Nigeria's 1962-68 Plan. To achieve this goal the regional government used a variety of policy tools to expand private production in order to drive down the price of eggs and to replace egg imports. Subsidized feed and chicks, free veterinary and technical support were the primary incentives offered by government.



The government launched an intensive production campaign in 1961 and by 1965 some 400 producers with about 150,000 hens produced nearly 182,000 dozen eggs. In 1965 supporting services for the industry included: one government and two private hatcheries, and a large veterinary and extension service. However, this substantial public effort of approximately £700,000 up to 1966 (or nearly \$2,000,000) failed to even approach the scheme's implicit objective of one egg per week for each urban consumer. The 1965 level of production could provide, if equitably distributed, about eight eggs per urban person annually.

The failure of the scheme was at least implicitly acknowledged by the regional government in early 1967 when it terminated an egg marketing scheme and began to consider a general retrenchment of the whole program. A number of problems have plagued the program. The supply of maize was erratic. An epidemic virtually destroyed the production of day old chicks for a year. The RIR stock provided by the government was inferior as compared with hybrid stock supplied by a private hatchery. The market for eggs was limited as soon as egg imports were replaced with local eggs.

The commercial egg scheme like most other agricultural production schemes in Eastern Nigeria's 1962-68 Plan was launched with very little micro-data on the economics of egg production and with a lack

of knowledge of consumer expenditure patterns. For these reasons the focus of this thesis involved the collection of primary data on egg production and consumption. A survey of 100 poultry entrepreneurs was completed in 1966. Farm records were collected for 33 flocks on 21 farms over a six-month period in 1966. Finally a survey of 456 consumers in four cities in Eastern Nigeria was completed in 1966.

The data generated in the study suggest how the industry should be reorganized if the Nigerian-Biafran civil war had not taken place during the 1967-70 period. For these reasons the use of the term "Eastern Nigeria" refers to the land area and conditions in Nigeria prior to the Civil War. The records from the 33 flocks on 21 farms provided technical data for synthesizing five types of farms: representative, best one-third, small, medium and large. Each type of farm was characterized by a unique combination of technical coefficients (feed-egg conversion, mortality, eggs per hen, etc.), and levels of input use (number of workers, investment in house and equipment). The groups were further broken down by hen type (RIR and hybrid) and feed type (subsidized and commercial). Finally, the economics of production was compared in six main markets.

The analysis of net margins revealed the importance of scale and management in profitable poultry farming. In the case of subsidized feeds, all five types of farm units using hybrid stock

earned a positive net margin. With subsidized feed and RIR stock, the small producer category failed to obtain a positive net margin. In the case of farms using commercial feed (non-subsidized) and RIR stock, only the best one-third produced positive net margins. However, two-thirds of the regions' farms are small, two-thirds of the total stock is RIR and one-half of the feed fed is subsidized.

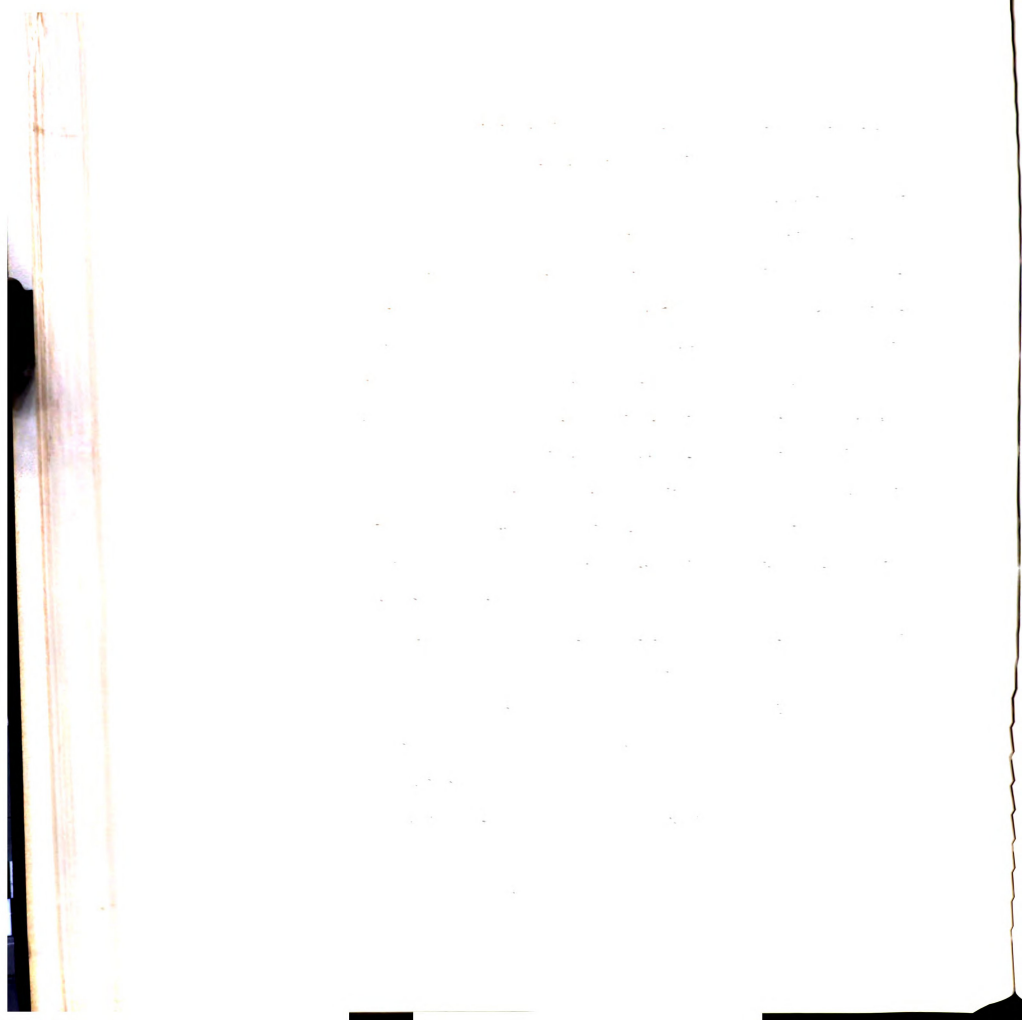
The owners of the best one-third firms had more experience in trade and business relative to the representative owner. The representative poultryman had been in the poultry business for four years, located his operation at the family farm, employed a manager and did not keep adequate farm records. Many owners were urban persons who operated as absentee operators providing little guidance to the management of the firm. Whereas half of those interviewed considered the enterprise as their most important work, three quarters of them earned less than a quarter of their incomes from their flock.

A number of farm adjustments are possible in order to improve the efficiency of egg production. A switch from RIR to hybrid stock is the most important. Better feed use and especially better feeders can help improve efficiency. Better flock management is needed. A smaller labor force would increase gross margins. In the long-run

cheaper housing would stretch the capital investment of many units. All of these changes could lead to more efficient and likely larger egg enterprises.

The consumer survey revealed that although eggs were a widely accepted "superior" food, less than 20 percent of those interviewed were consuming one egg a week. However, 74 percent said they would eat more eggs if prices fell. Egg consumption was found to be highly correlated with income and education levels. Low per capital incomes were found to be the greatest barrier to an expansion of egg consumption.

The Government of Eastern Nigeria has decisions to make in light of the heavy subsidy that has been used to support the industry. This thesis advances the following policy recommendations. Since the government encouraged about 800 farmers to enter commercial poultry production it is important for the government to maintain an active interest in the poultry industry. If the government withdraws its support a credibility gap will emerge and other government programs could suffer. The main recommendations are for the government to (a) continue research to drive down the cost of producing maize, (b) upgrade its extension program in order to offer better managerial advice to farmers - especially to encourage farmers to adopt hybrid stock, (c) encourage about half of the present producers - mainly those near large urban centers - to continue producing eggs,



(d) continue the veterinary support program, and (e) withdraw the feed subsidy by a given date, say two years.

If the above steps are adopted about half of the smaller and inefficient producers will likely withdraw from the industry over a two-year period. Our data reveal that well-managed farms using commercial feeds and hybrid stock can produce eggs at the farm-gate for about 2/3 (.31¢) per dozen which is about the same price as the nearest substitute - guinea fowl eggs. Transportation, wholesaling and retailing will add a further 1ld. (.14¢) per dozen in order that consumers should be able to purchase eggs in urban centers for about 3/3 per dozen.

If the above adjustments are made my research suggests that Eastern Nigeria could support an unsubsidized industry of 150 producers each with 2,000 layers (the present size of the best one-third of the units). These 150 producers could produce about six million dozen eggs annually without any government feed subsidy. The six million figure is still only 40 percent of the level needed to meet the nutritional goal, but produced by a viable unsubsidized industry. There seems little scope to reduce the cost of production below the levels presently reached by the best one-third. Further reductions in the price to consumers would have to come from improvements in the efficiency of the distribution system.

2. Conclusions

Perspective has a great deal to do with the judgments one reaches with regard to the priorities of development. One can argue that a massive expansion and upgrading of social-services - health, nutrition, welfare - is a prerequisite for accelerated expansion of national product. Or one can argue, that such services follow from the growth of economic capacities and will be limited by the size of the supporting economic base. It seems questionable, given the vast needs confronting Eastern Nigeria in 1961 that it was the proper time to invest so many resources in promoting egg production in order to solve the protein problems of Eastern Nigeria consumers. Moreover, little if any attention was given to alternative approaches to achieving the nutritional goal. Instead, increased poultry production was assumed to be an end in itself. Even though the price of eggs was reduced and egg imports were eliminated, the program benefited a few urban consumers and did little to improve the nutrition of the bulk of society. The relatively high cost of maize and poor management are two major problems which prevented the price of eggs in urban centers to fall below 3s 3d. per dozen. The lack of effective demand (purchasing) among the average consumer dictates the need for the average urban consumer to search for cheaper sources of protein than eggs. Moreover, if feed subsidies are eliminated, about one-half of the producers will

leave the industry. If feed subsidies are eliminated the ability of the industry to reach a mass market will depend on measures to increase the effective demand of the masses, and reduce the cost of producing maize and improving the management of producing eggs.

A number of other countries have also initiated commercial egg projects, usually on the grounds that they are simple to start. Failure in these countries, or partial success, has been most often associated with a lack of market than the inability to introduce the new techniques of production. This has been as true in Punjab, for example, as in Eastern Nigeria. A careful examination into the potential market for eggs would appear an important first step in evaluating a commercial egg scheme. Interestingly in neither the Indian nor Nigerian case was such an inquiry made; a market was assumed.

3. Opportunities for Research

In the course of this study a number of areas have been identified which would appear to offer fruitful future research opportunities.

These are:

- a. alternative sources of protein, both cereal and animal.
- b. alternative types of feed inputs which could substitute for maize.
- c. problems of maize improvement, its cultivation, production and distribution.
- d. cost and feasibility studies of feed mill, hatchery and vaccine production.

- e. responses by entrepreneurs to varying credit arrangements.
- f. study into decision-making and relevant variables in indigenous management.
- g. study of types of record-keeping and interpretation possible for semi-literate managers of small enterprises.
- h. development of teaching techniques of business management principles.
- i. food consumption surveys.
- j. farm management analysis of organization and economic efficiency on "mixed" farms.
- k. inquiry into alternative organization of cooperatives.
- l. analysis of transport costs.

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2. The second part of the document is a letter from the Secretary of the Treasury to the President, dated January 3, 1862. It is a very important document, as it contains the Secretary's report to the President on the state of the Treasury.

3. The third part of the document is a letter from the Secretary of the Treasury to the President, dated January 3, 1862.

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APPENDIX A

OUTLAYS INCURRED OF THE GOVERNMENT OF
EASTERN NIGERIA ON BEHALF OF THE
POULTRY SCHEME

An estimate of the cumulative cost of the poultry scheme is difficult to reconstruct and is in fact probably unknown even to planners. The difficulty derives mainly from the dispersion of the scheme among several projects that appear in the 1962-68 Development Plan. No central plan or budget exists entitled 'the poultry scheme', rather the scheme is scattered across six titles each with a budget, all of, or portions of each, having contributed to the establishment of the scheme (Table A-1).

The development plan outlines in a general fashion the 'votes' or allocations earmarked for the projects and lumps these into two figures: capital outlay and recurrent outlays, which summed represent the total anticipated cost of a project over the planning term. Capital outlays include the capital equipment for the hatchery, feed mill, etc. Recurrent costs are the estimated operating or servicing outlays that must be paid over the term of the plan. Wages, petrol, all variable factors of production, fall under this category. Government policy calls for users to pay for recurrent costs, while it covers the fixed costs. In practice, however, government had had less than complete success in deciding exactly what price to charge users for services.

Table A-1

Projects related to Poultry in the Eastern Nigerian
Development Plan

Project No.	Title	Outlay in £ 000 (1962-68)		
		Capital	Recurrent	Total
12	Extension Training - Program including - Veterinary	£ 1,311	£ 1,958	£ 3,269
13	Livestock Extension	40	200	240
19	Poultry Centre	66	214	280
20	Brooder Units (148 only)	55	35	90
22	Animal Feed Mill	50	870	920
24	Veterinary Services	180	276	456
Total		£ 1,702	£ 3,553	£ 5,255

Compiled from the Eastern Nigeria Development Plan, 1962-68, page 62-68

Since the prices charged have varied, the effect makes an estimation of final net cost to government for the establishment of the poultry scheme quite complex.

This difficult situation is made still more slippery since only a portion of several projects have contributed to the poultry scheme. The projects comprising the poultry scheme, in whole or part are as follows:

Project Number 12: Extension Training Program including Veterinary

This project seeks to train 2,500 extension workers over the planning period. In practice the extension service contributes a very modest proportion of their efforts on behalf of poultry rearing, perhaps 10 percent or £ 326,000 over the term.

Project Number 12: Livestock Extension

The objective of this project is to turn out large numbers of inoculators to service the veterinary program. As poultry is the major livestock of the region it is possible to assign some 80 percent of this vote to the poultry scheme or £ 192,000 over the term.

Project Number 19: Regional Poultry Center

The center piece of the poultry project, all of the capital outlay for this activity may be changed to the scheme. For the net cost of recurrent charges, a more complex matter arises. Brundage studied the Abakaliki unit in 1964 and reports that revenues covered no more

than half of the recurrent costs incurred in the center's activities. Thus all capital outlays and 50 percent of the recurrent charges are charged to the poultry scheme - a total of £ 173,000.

Project Number 20: Brooder Units

The brooder project was dropped after a year when it became evident that it would be impossible, given existing practices by poultrymen. The expected outlays for this project, therefore, have not been made. However, most of the initial capital outlays were spent and brooder units were established in most of the planned sites. Clear cut figures are not available but it would seem safe to debit the entire project, for financial year 1962-63 to the cost column of the poultry scheme, or £ 90,000.

Project Number 22: Animal Feed Mill

As part of the expanded livestock program it was expected to set up a mill to provide 4000 tons of animal feed annually. The plan stated that the recurrent cost of its operation would be eventually met from revenue, while manufacturing overhead would be borne by the region as a subsidy. A rather jerry-built feed mill was constructed as a stop-gap in anticipation of the eventual arrival of a modern mill. The outlay assigned to the feed mill in the development plan assumes the acquisition of a new mill in 1968 from the United Kingdom costing some £ 50,000 to purchase and establish. A Ministry spokesman reports that a firm

order has been placed with Simon Barron in United Kingdom, for the purchase, installation and commissioning of a mill with a capacity of four tons per hour.

In 1964 Brundage examined the costs of production of operation of the present mill. He found that it costs £ 38 to produce one long ton of layer ration. Brundage also found that loss through storage was the second highest item of cost - now being remedied with the construction of silos at the mill site. When Brundage did his study, MOA sold at 4 d. (5¢) per pound, but the price has since been reduced to 3/2 d. per pound. At the former price Brundage found that the MOA was nearly breaking even, losing only £ 5/1/5 per month. Udosen estimates that at the new price the MOA may be losing over a £ 1000 a month. As the cost of maize has risen this gap must become correspondingly greater. Once again expectation with regards to the ability to recover current variable costs from current revenue has fallen short of practice, adding to the total cost of the poultry scheme. It seems too fair to charge all capital outlays and 50 percent of the recurrent charges to the poultry scheme, a total of £ 485,000.

Project Number 24: Veterinary Services

Under this title lies the largest single money outlay actually made by the regional government for the poultry scheme - namely free veterinary services, vaccines, interns, services and support. As poultry is the largest user of the inoculations and veterinary time, it seems reasonable to assign 80 percent of the total outlay to the project, or £ 364,800.

Some new costs have been assumed by the government in 1966-67 which are the direct effects of the political disturbances of the period. The vaccines formerly produced at the Federal Research Station at Vom, Northern Nigeria, are now to be produced at a new center being established at Enugu. This will represent a new charge, some part of which must be debited to the poultry project. Further, the new maize planting and silo programs will add to the debit side as well.

APPENDIX B

THE MAIZE PROBLEM^{1/}

"Rain is the Husband of the Earth"

Talmud

1. Introduction

The supply of maize to feed mills in sufficient quantities may become the Achilles heel of the commercial egg industry. This problem is likely to grow more acute for three reasons: (1) The increasing numbers of hens on litter in the region (nearly 400,000 by 1969)^{2/}; (2) The increasing difficulty in obtaining maize from Nigerian sources outside the region; and (3) The lack of success in developing sufficient maize production from within the region. The first two points have been covered in the text. This appendix will focus its attention upon the particular problems encountered in attempting to develop an import-substituting maize industry in Eastern Nigeria. Although the MOA has

^{1/} I am indebted for much of the material in this section to A.S. Oruche, who as a member of the staff of the Poultry Project travelled widely in the region to collect it. Also R. Tolar and C.E. Okeke of the MOA - feed grain section have provided information. Some data was afforded by the Poultry Workshop Nsukka - August 1966.

^{2/} An estimate by the author in a report to Arthur P. Little, Inc. in response to an inquiry from them, March 1, 1967, Appendix H.

1910

1911

1912

1913

1914

1915

1916

1917

1918

1919

1920

1921

1922

been attempting to induce greater local production since 1963-64 the problem has become acute following the embargo of all goods coming from Northern Nigeria (August 1, 1966) - the source of virtually all of Nigeria's maize. The magnitude of the problem is put in relief when it is realized that so far only 17 percent of Eastern Nigeria's annual needs (5,000 tons in 1966) have been met from purely Eastern production.

2. Background to the Present Maize Crisis

Producers of maize in the northern middle belt have hitherto been able to meet the increased demand for maize from all Southern Nigeria without any governmental program. Evidently the production - marketing situation has been efficient enough and producers alert enough to grow maize as it appeared to their economic advantage to do so. However, in 1965 - the rate of increase in demand for feed by the expanding layer flocks in both Eastern and Western Nigeria began to outstrip plantings. By 1965-66, before the political disturbances, maize became very scarce. Millers attributed this scarcity to the following factors:

1. The great increase in demand for poultry feeds not accompanied by increased plantings of yellow maize.
2. A shortage of maize seed (NS-1).

3. Inclement climatic conditions over the whole of Nigeria, especially poor rainfall distribution, leading to a very small crop.
4. Shortages of human food led to extension of plantings for root crops to the detriment of livestock feeds.
5. Inadequate storage facilities for the amount actually harvested.
6. A high moisture content in the kernels further reduced the amount of maize that could actually be used in rations.

All these factors acted to cause shortages which led to a 1966 rise in maize prices. But some of these factors represent fundamental problems which are likely to persist to affect feed costs for years to come.

The strongly autarchic note found in the Eastern Region since the beginning of a separate regional development was reflected in its determination to produce maize in the region. Since 1963 it has annually distributed seed to farmers in areas which seemed suitable to maize cultivation (Table B-1) but the results have not been encouraging. Now, with the region cut-off from the rest of the country, the maize production program must be successfully completed if a commercial egg industry is to be supported. Consequently the reasons for the failure to date to obtain the hoped for production in the Eastern Region must be examined.

Table B-1

Corn Seed Distribution, Production and Price Paid
Per Ton

Year	Tons Seed Distributed	Tons Maize Bought By MOA
1963	10	None
1964	39	21
1965	50	52
1966	55	?

3. The Section of Strain and its Characteristics

Maize, white and yellow, has been grown in Eastern Nigeria for many years. The present strain favored as a feed - NS-1 - was introduced in 1954 from Trinidad (British West Indies). The variety was accepted for distribution to farmers because of its high yield under varying environments (in rich soil the yield is up to one ton of dry grain per acre). Additionally the variety manifests resistance to rust, has good storing qualities, and a high (75 percent) cob/grain ratio. The kernels harden on maturity which help increase their resistance to weevils. Also high carotene content enriches the vitamin A content of eggs and increases the yellow tint of the yolk (desirable to consumers).

4. Technical Problems of Growing NS-1

Maize, a minor crop to farmers, is usually inter-dropped with yams, cassava, okra and cocoa yam. The practice of inter-cropping does not permit early planting of the maize causing it to be grown under less than optimal conditions. Organic manure is rarely applied to the crop.

The soil of Eastern Nigeria is highly acidic (PH of 4.5 or less); under heavy rainfall it is subject to severe erosion, leaching of bases and fixing of phosphates occurs. These factors limit the average yield in the region to 700-1000 pounds of dry grain per acre, a level far below the world average of 1440 pounds.

Acidity also limits the levels of production. The poor yield caused by the low nutritive content associated with high levels of acidity, is aggravated by the fact that little or no lime is used by farmers in maize cultivation. Of farmers interviewed, few used fertilizer and none admitted using commercial lime. The reasons given by others for not using either or both on their maize plots were: (1) Their non-availability; (2) lack of knowledge of application and dosage; (3) failure to see the benefit from the use of lime and fertilizer; and (4) inability to pay for their purchase. Failure to use nutrients accounts in large part for the low maize yield in the poor sandy soil of the region.

Other factors act as well to limit the productivity of maize. Farmers are often ignorant of fungicides and insecticides that are available to them. Once their crops are infected, farmers attempt to sell-off the maize as quickly as possible, effectively removing the entire crop from the feed grain market.

Some farmers apparently believe that NS-1 uses an inordinate amount of soil nutrients, adversely affecting other crops. The rapid growth of the plant appears to bear this out as farmers feel that such performance is somehow unnatural. The tall and luxuriant growth of the grown plant worries farmers too. They think that it can easily lodge and that it has the tendency to bend over and cover other inter-cropped plants shielding them from sunlight. This tendency to bend

is brought about by the practice of planting the maize at the base of the yam mound or planting it in too shallow troughs on flat ground. Here it is also subject to damage from erosion.

One good quality of NS-1 is early and high percentage germination, but this very quality is a factor causing farmers to reject it. When farmers interplant, they sow NS-1 and other food crops in at the same time. However, NS-1 germinates before these crops do. The plant presents broad green leaves, which attract hungry birds and rodents, being the first young plants of the growing season (alternative foods are still brown and dry after the long dry season). Pests often devour the leaves and up-root the young seedlings. Hence the early germinating maize becomes the first food of the season sustaining great damage on this account. To offset this problem farmers plant maize in plots nearer home which typically are much smaller - once again imposing a constraint on final total product.

5. Cultural Factors which Inhibit Maize Production

The economic organization of local agriculture has an effect on levels of maize production. The custom exists that maize cultivation should be left to women, along with melon, okra and sometimes cassava. The man clears the bush and makes the mounds. He also plants and tends the prestige crops - such as yam. Women supply labor to the tending operation for which input they are compensated with the rights

to minor crops. To be sure that the women have an adequate amount of available time to attend prestige crops the man restricts the amount of minor crop acreage planted. Further, men do not wish their wives to be too successful in their independent income ventures so they also restrict the area given to minor crops so as to moderate the women's income possibilities. For these reasons maize cultivation is suspended between the horns of the classic dilemma - custom does not allow men to cultivate maize, and it limits the amount the women can grow.

In a farming community certain areas are selected each year for cultivation and every farmer within that community is bound to plant his crop within the selected area. This practice places a constraint upon maize producers in that it mixes NS-1 with other maize varieties. Under such circumstances the NS-1 is affected by pollination from those types which have a depressing effect on both yield and quality of the variety. If a farmer wishes to raise good NS-1, he should separate it from other varieties or vice versa but this action can bring him into conflict with other members of the farming community. Friction of this sort can induce a farmer not to introduce NS-1 as a separate crop and cause him to discontinue it.

6. The Extension Service

The extension service has been the intermediary and change agent acting for the MOA at the farm level. The role of extension agents has

been both to encourage the introduction of NS-1 cropping and to supply the necessary seed. Extension agents have attempted to persuade farmers to use the variety with several arguments: (1) a new source of income; (2) a new source of food; and (3) the great need for the crop by the poultry industry. However, the reasons given by farmers for cultivating maize are strikingly different. Farmers said they grew it: (1) in obedience to government order; (2) because seeds were supplied free; and (3) to supplement other food crops. It does not appear that farmers are aware the crop is being grown primarily as a livestock feed for which they will be paid. Neither do they seem to be aware that the NS-1 is offered because of its superior yield characteristics.

Some new insights into this matter were obtained from research done by the Diffusion of Innovations project field staff working in Eastern Nigeria. They report that farmers interviewed in Owerri province are apparently unaware that the special maize strain - NS-1 was not intended for human consumption. Rather they treated it as a human staple either eating the government provided seeds or the final crop. When cooked it was found to be tough and unpalatable. Being clearly unfit for human consumption they declined to plant it again.

The staff of both the poultry and Diffusion project found these beliefs and attitudes quite widespread. Enumerators asked farmers what crops - activities and practices extension staff personnel have

stressed. Responses indicate that the service has emphasized ten items: tree crop rehabilitation, fertilizer, poultry rearing, etc. - maize ranking third from the bottom. This lack of emphasis is especially trenchant when it is recalled that the extension service is virtually the only media generally reaching the farmer with regard to agricultural practices.

7. Economic Factors Affecting Maize Production

This general lack of public understanding of the maize program and the associated paucity of response does not reflect an absence of tangible stimuli offered by the MOA. The MOA has provided increasing amounts of free seed each year since 1963, and a guaranteed price purchase program has been followed.

Farmers have not made optimum use of this seed from the point of view of the MOA. Farmers who have accepted NS-1 maize as a cash crop find it hard to grow all they want because insufficient amounts of seed are provided to them. Sometimes they supplement the MOA seed with that of regular maize to get a full crop. The lack of seed reflects the way in which the MOA distributes seed. Each district is sent a certain amount. If, in one district, demand for the seed exhausts its allotment, seed is not diverted to this area from districts where there has been insufficient demand, although few areas have experienced such a positive response.

The time of maize planting varies in different areas. The distribution of seed often does not conform to the required planting time in a particular area - which fact likely discourages both the entry of new producers and the size of operation of present producers.

The prices paid by the MOA were designed to be competitive with other food crops. The prices paid by the MOA per ton (Table B-2) at government collection points, usually the extension agents office, have ranged upward from £ 20 per ton to as high as £ 50. The average price paid, however, has remained below £ 30. The same price is paid all over Eastern Nigeria for NS-1. The price has been established by adding 10 percent to whatever the market price is for non-NS-1 maize. Only dry, shelled maize of 14 percent moisture content is bought at the collecting station.

Farmers have not rushed into maize production since 1966, because rapidly rising food prices have made food production for human consumption more profitable. Farmers report that, aside from melon, maize earns the least of all food crops. Only at farm settlements do farmers state that the price paid by the MOA is equivalent to food prices, but this seems to reflect the practice of the settlement coops to pay lower prices for food crops.

A further factor tending to depress the incentive value of the MOA price is the practice of taking the maize from the farmer on credit - cash

Table B-2

Prices Paid to Farmers for Maize by
the MOA*

Period	Price Per Ton
11/65 - 1/66	£ 25
2/66 - 5/66	33
6/66 - 11/66	50 (including sorghums)

* MOA Feed mill records, Enugu, prepared by staff - 1/11/66.

coming somewhat later. White maize, produced for human use can be sold directly for cash.

Transport difficulties exist in moving NS-1 from farm to the collection points. Farmers are required to carry the harvested maize to the extension agent's house where the sale is made. This movement can be costly, difficult and time consuming. Farmers bring their maize by bicycle, canoe or head portage. Seldom do they have enough to pay for their hire of a truck. If the farmer cannot obtain use of a sheller the problem of movement is multiplied that much more.

The question of storage has been difficult but is improving. In Eastern Nigeria farmers harvest NS-1 from June to August. The actual time selected is related to the period of great rainfall and farm activity. When working with coco-yam, rice and other minor crops they have little time to handle drying of maize. The custom is to send wet and fresh maize to the extension agent who rejects it because of its high moisture content. Such a refusal discourages farmers from planting it again. Premature harvest and improved storage practices take a serious toll of what maize production there is. Prematurely harvested maize is so moist as to severely limit storability. Also weevils find such maize more succulent.

The MOA is building modern granaries in areas of likely maize production: Ikom, Abakaliki, Ugep, Afikpo and Boki with a combined

capacity of 900 tons. Six others are proposed.

A final and a most serious factor likely to retard any substantial increase in maize production is the competition for land with other crops used directly as human food. NS-1 is rarely used in preparing local staples. Discussions with farmers and extension persons revealed considerable resistance, in principle, to the substitution of maize for staple foods, even were prices to indicate this to be a rational action.

8. Summary

In the face of expected difficulties in obtaining maize, the regional government is pushing ahead with a very ambitious hatchery program. By 1968, if the present rates of chick production continue unabated there will be in excess of 300,000 chickens of all ages to support which will consume nearly 8,000 short tons of maize annually. If the maize is to be domestically produced, the order of priorities in the minds of extension personnel will have to be restructured, and adequate seed made available when and where it is needed. In the short-run, the farm settlements of Boki and Erei may be able to contribute considerable output. For the longer-run it seems clear, that methods of payment, collection and channels of market information will have to be reevaluated. Prices offered for the maize may have to be set so as to offer real incentives to farmers to produce them and such prices will raise the real costs of this input for the poultry industry. Also the technology

of harvesting and drying needs to be better understood among the farmers.

An alternative to domestic production would be importation; if neither domestic production nor intra-Nigerian movements are forthcoming, sufficient imports will remain the only possible source. Of course, such action will claim a share of the region's foreign exchange.

APPENDIX C

ENTREPRENEURSHIP IN THE HATCHERY SEGMENT
OF THE EGG INDUSTRY

The importance of a commercial background may be a factor in explaining the pre-eminence of the Onitsha -Ibos in the poultry business. People from the Onitsha district have played a leading role in the development of both the production and hatchery segments of the egg industry. Of 13 respondents in Abakaliki province nine came from Onitsha. Onitsha persons were prominent in Enugu, Port Harcourt and Umuahia provinces.

The importance of being from Onitsha is underscored by the experience of hatchery entrepreneurs, which is the other segment where Nigeria private investors have been very active. Being larger investments, and somewhat more risky ventures, they warrant a closer look. Many similarities exist amongst the three Nigerian-owned hatcheries: Lincolndale, PAC and Chukwurah, both as regards their origins and problems.

Lincolndale, the largest, is owned by P. C. Odeluga, who entered the business when it became evident that the MOA was unable to meet the demand for day-old chicks. He has a B.A. from Lincoln University (hence Lincolndale) and an M.A. (Economics) from

THEORY

The theory of the present experiment is based on the fact that the rate of reaction between a metal and an acid is proportional to the surface area of the metal exposed to the acid. In this experiment, the rate of reaction between zinc and hydrochloric acid is studied. The reaction is represented by the following equation:

$$\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$$

The rate of reaction is measured by the volume of hydrogen gas evolved over a given period of time. The volume of gas evolved is measured by the displacement of water in a graduated cylinder. The rate of reaction is then calculated by dividing the volume of gas evolved by the time taken for the reaction to occur.

The rate of reaction is expected to increase with the surface area of the metal. This is because a larger surface area provides more sites for the reaction to occur. The rate of reaction is also expected to increase with the concentration of the acid. This is because a higher concentration of acid provides more reactant molecules, which increases the frequency of collisions between the metal and the acid.

The rate of reaction is also expected to increase with the temperature of the reaction. This is because a higher temperature provides more energy to the reactant molecules, which increases the frequency of collisions between the metal and the acid.

The rate of reaction is also expected to increase with the pressure of the reaction. This is because a higher pressure provides more reactant molecules, which increases the frequency of collisions between the metal and the acid.

The rate of reaction is also expected to increase with the catalyst. This is because a catalyst provides an alternative reaction pathway with a lower activation energy, which increases the frequency of collisions between the metal and the acid.

New York University. Although initially a public school teacher, and sometime politician, he entered entrepreneurial activities in 1959 when he opened a night-spot and 'hotel' in Onitsha. Subsequently, after a year as a commercial poultryman he invested in a hatchery, having learned hatchery technology from a book. He has at present two incubators - one of 10,000 capacity in Onitsha and a second of 5000 capacity at Aba. The firm has been financed out of his own funds.

Odeluga has developed his market outlet in a vigorous and straightforward manner. Large bulletin boards were erected around Onitsha and Aba on which American-style aggressive promotional copy was presented. Handbills were also used. He has been able to capture and so far hold a small wedge of the market - about 14.5 percent (July 1966). Doubtless the difficulties at Abakaliki have helped him both establish the firm and maintain his position. Odeluga does foresee difficulties as the MOA begins to offer sexed chicks.

In addition to the hatchery Odeluga is President of the Poultry Cooperative Association to be discussed under the marketing subtitle. In this position he stands as the principal spokesman for producers, and by virtue of the position will become an important figure on the Board of the Cooperative Egg Marketing Scheme which

is scheduled to be taken over by the poultry association in April 1967.

The two smaller hatcheries are PAC Ltd., and Chukwurah, both of Onitsha, date from 1964. The owners of both firms have been traders of considerable experience in the Onitsha market (largest in West Africa). PAC (Poultry-Agriculture Company) is unique among the firms studied in that it is a purely Nigerian joint stock company comprising three traders who worked together for ten years before forming the firm in 1961. They have used capital accumulated in their trading operations to finance several ventures: oil palm and pineapple plantations, commercial eggs, and the small hatchery. The firm has an incubator of 10,000 egg capacity (costing £1400) which is located in a rented building. The partners are now talking of making a franchise agreement with a United Kingdom firm to provide foundation stock for their line. At present, part of their business is producing hatching eggs for Lincolndale. PAC has a slender sliver of the market, two to three percent, partially explained perhaps by the feeble promotional efforts made by the firm: circulars and an occasional advertisement in the newspapers. But only one-sixth of the firm's assets are tied up in the hatchery enterprise.

The third is Chukwurah, founded and owned by a former trader in shoes in the Onitsha market. The savings from thirteen years of trading was invested in his poultry hobby to transform it into his main source of livelihood. Although Chukwurah has only six years of formal

education, he is one of the more knowledgeable poultry men and possesses one of the few extensive libraries on the subject among persons interviewed for this study. He is aware, for example of the genetic shortcomings of his inbred stock (or is at least the only one to acknowledge it) which recognition has led him to an active search for an expatriate partner on the model of Ejinaka & Thornber, Ltd. At the time of this writing, Chukwurah felt that such an arrangement was very likely to come to fruition. Together these two hatcheries have less than 10 percent of the market.

These three firms share several factors in common. Importantly and perhaps significantly, all three groups of entrepreneurs sprang from trading backgrounds, a trait which persists with husbandrymen as well. All acknowledged a considerable knowledge of business record-keeping, to an understanding of the implications of risk taking as this relates to their segment of the industry, and to the problems of capitalization, depreciation and inventory. Interestingly, all three of these firms have appeared in Onitsha, the earliest town in the region to develop an educational system. Further, it has been and remains the trading center of the east as well as a focal point for regional politics, business and communication.



APPENDIX D

METHODOLOGY

The field research to gather the primary data used in this study was conducted in three parts over a six month period in 1966. The first part - Phase I examined the poultrymen themselves and developed the information necessary to select farms for Phase II. Phase I was carried out in July 1966. Phase II was continued over a five-month period from August 1, 1966 to December 31, 1966. During this part of the study the production records were kept which provided the cost of production data used in Chapters 5 and 6. The III and final phase, the consumer survey, was done in the last two weeks of December 1966. The organization, sample frame and methodology followed in each of these three phases are developed in detail below.

Phase I

Phase I sought by use of a questionnaire to develop background data on poultrymen presently in production in Eastern Nigeria. To develop a population from which to draw a sample the vaccination records of all the veterinary offices in eight provinces of the region were examined in March 1966. The names of all persons who had had 100 or more chicks vaccinated in the past 12 months (since March 1965) were taken.

The veterinary records yielded 348 names of farmers possessing 100 chickens or more in the eight provinces to be studied, out of which a one-third sample (of 116 sample units) was taken. To be sure to get producers of all scales of operation the sample was divided into six strata (see Table 1-1). A third of each stratum was selected for the sample by simple random sampling. Only four very large flocks (of 4000 or more) were found, and all were included in the sample to build a total sample of 120 units.

In actual enumeration it was discovered that the population developed from the veterinarian records was somewhat overstated. Enumerators discovered several instances of double listing by veterinary clerks. Some fifteen of the 120 farm sites were eliminated in this way.

In addition, provision had to be made for poultry farms presently out of business and for those whose level of activity had either dropped to below the 100 hen size or had been mis-stated on the veterinary records. The following replacement rules were adopted for these cases.

1. Where a person had had 100 or more birds but now had either a reduced flock or none - the interview was carried out.
2. Where the respondent had never had a 100 or more birds - the unit was dropped without replacement.

(The latter practice was adopted under the assumption that the erroneous inclusion had inflated the original population by one unit and that to use a replacement would accordingly swell the sample beyond one-third size of the estimated population.)

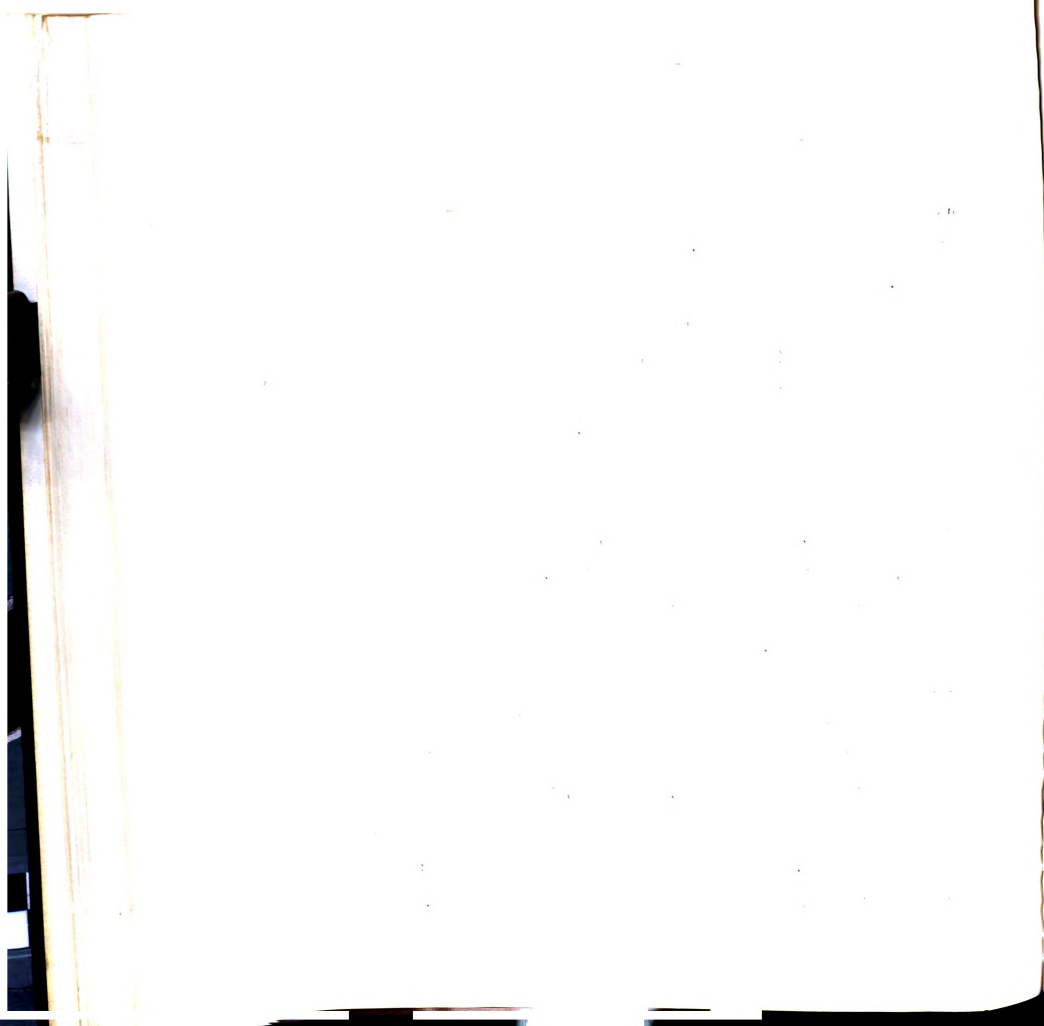
3. Where a person on the sample list was unavailable for any reason for interview, and no suitable proxy for him could be found (wife, senior son, brother) an alternative unit was provided. If the alternative could not be found the unit was dropped from the sample.

As a result of these deflating factors the actual sample taken of poultry farms was 100 units. The MOA took a census of poultry farms in November 1966. They counted 316 sites, a third of which would be 105, not significantly different from our figure.

The findings of Phase I provided the basis on which to draw the farms used in Phase II.

Phase II

The object of this phase was to develop production efficiency figures for different poultry operations of different scales of activity and using different types of layers. In addition, it was hoped that figures on the best third of the producers as well as the typical producer could be developed. Two limitations affected the method of study: (1) the period under study was an abnormal year for two reasons.



First, considerable feed scarcity existed during the summer of 1966 which at first was thought to be a serious influence on the findings. Fortunately, this crisis was largely over by the time the records were introduced. Second, due to depopulation and consequent cession of production of day-old chicks at Abakaliki, few MOA-RIR flocks could be found in the mid-period of their laying lives. The average age of MOA layers at the time of the study was quite high, about 60 weeks; and (2) in planning and initiating this project we had to decide whether a large number of farms should be covered with little supervision or a few with much greater supervision? It was unknown at the time just how responsive and responsible the staffs of the farms would be in keeping the day-to-day records. Farms were often awkwardly located with regard to transport. Enumerators often had to spend a day just visiting a single site. Having only a staff of six, it was judged that the more limited study would be the less risky, so that one enumerator could efficiently handle about five farms if he were to visit each twice a week.

On the Phase I questionnaire respondents were asked whether they would be willing to participate in a five-month study. Almost all said yes, the nays principally deriving from the largest operators.

Two further conditioning factors had to be considered before selecting the target farms.

1870. 1871. 1872. 1873. 1874. 1875. 1876. 1877. 1878. 1879. 1880.

1881. 1882. 1883. 1884. 1885. 1886. 1887. 1888. 1889. 1890. 1891.

1892. 1893. 1894. 1895. 1896. 1897. 1898. 1899. 1900. 1901. 1902.

1903. 1904. 1905. 1906. 1907. 1908. 1909. 1910. 1911. 1912. 1913.

1914. 1915. 1916. 1917. 1918. 1919. 1920. 1921. 1922. 1923. 1924.

1925. 1926. 1927. 1928. 1929. 1930. 1931. 1932. 1933. 1934. 1935.

1936. 1937. 1938. 1939. 1940. 1941. 1942. 1943. 1944. 1945. 1946.

1947. 1948. 1949. 1950. 1951. 1952. 1953. 1954. 1955. 1956. 1957.

1958. 1959. 1960. 1961. 1962. 1963. 1964. 1965. 1966. 1967. 1968.

1969. 1970. 1971. 1972. 1973. 1974. 1975. 1976. 1977. 1978. 1979.

1980. 1981. 1982. 1983. 1984. 1985. 1986. 1987. 1988. 1989. 1990.

1991. 1992. 1993. 1994. 1995. 1996. 1997. 1998. 1999. 2000. 2001.

2002. 2003. 2004. 2005. 2006. 2007. 2008. 2009. 2010. 2011. 2012.

2013. 2014. 2015. 2016. 2017. 2018. 2019. 2020. 2021. 2022. 2023.

2024. 2025. 2026. 2027. 2028. 2029. 2030. 2031. 2032. 2033. 2034.

2035. 2036. 2037. 2038. 2039. 2040. 2041. 2042. 2043. 2044. 2045.

2046. 2047. 2048. 2049. 2050. 2051. 2052. 2053. 2054. 2055. 2056.

2057. 2058. 2059. 2060. 2061. 2062. 2063. 2064. 2065. 2066. 2067.

2068. 2069. 2070. 2071. 2072. 2073. 2074. 2075. 2076. 2077. 2078.

2079. 2080. 2081. 2082. 2083. 2084. 2085. 2086. 2087. 2088. 2089.

2090. 2091. 2092. 2093. 2094. 2095. 2096. 2097. 2098. 2099. 2100.

2101. 2102. 2103. 2104. 2105. 2106. 2107. 2108. 2109. 2110. 2111.

2112. 2113. 2114. 2115. 2116. 2117. 2118. 2119. 2120. 2121. 2122.

At least three types of chickens were discovered to exist on local farms: MOA-RIR, Thornber 404 hybrid, and other RIR. In addition a handful of WL, Harco, Hyline and "mixed" flocks were found to exist, but not in sufficient quantities to permit or encourage a separate study of their individual performances. Together the MOA-RIR and 404's comprised in July 1966 about 50 percent of the total flocks. Other RIR's comprised a further 22 percent, but these birds were so often of mixed antecedents as to render impossible any meaningful comparative breed performance study on them. The other types of birds were included in the final performance figures under the rubric of 'typical performance'.

Chickens, as living creatures, perform differently at different phases in their lives. Rates of egg production and efficiency with which they convert feed to eggs are functions of age and these characteristics vary between different kinds of chickens. Ideally records ought to be kept over the entire life of the flock from day-old to the eightieth week when it reaches the end of its productive life and is liquidated. However, only five months were at the disposal of the study. To offset this limitation, synthetic flock histories had to be developed. The questionnaire in Phase I had provided hatch dates, breed, flock size on all studied farms. Farms were divided up into three stratum based on their total number of birds on litter. These stratum were: (1) less than 301;

(2) 301-900; and (3) 901 plus. Within each of these groups flocks were selected of different breeds, subject to their hatch date. The object was to gather for each stratum flocks of each type and age so that at the end of five months production information would be available on each breed over its entire life. The assumption was, of course, made that all the birds in a breed would perform identically so that variations in their performance could be assigned to the managerial variable. Further tests could determine whether management had fallen down on housing, health, culling, watering, feeding or vice control.

The cessation of production at Abakaliki and the relative newness of the Thornber operation made it impossible to get enough flock histories from these breeds in each scale of activity. However, sufficient data was developed to put together synthetic typical histories of these birds. A synthetic flock history was assembled in the following way.

1. All hatch dates were gathered on a per breed basis.
2. The present age of the flock was noted, that being the date at the estimated time of the start of the farm record.
3. The age at the end of the five month record, or 80 weeks of age, whichever came first.
4. All records were kept on a per flock basis, all the birds in the flock being of identical age and breed.

Flocks begin to lay at about 22 weeks of age, and continue for some 58 weeks. So far as possible flocks were selected so that some were represented on the study for every week of this laying life, so that the five months available overlapped to provide a continuous record of the breed's performance for the entire production period. Performance figures: feed-egg conversion, percentage production, livability, eggs per hen housed, and eggs per hen per week could be assembled against the independent variable - time. A dispersion of the different performance figures would thus be generated per breed over time, which dispersion could be subjected to simple linear regression analysis, the final $\bar{Y}$ representing the 'typical' performance figure. A straightline is a less than perfect description of hen's performance over time, which actually more resembles a skewed arc (Figure 5-1); consequently poor fits were obtained. Extreme observations were dropped and the figures representing the early production period ignored as these give an entirely unrealistic picture of life-long performance. For example in 22 weeks a hen may eat 1.8 pounds of feed and lay one egg.

Records had to be developed that would allow standard performance figures to be generated - yet be sufficiently simple that semi-literate staff could manage them at the farm site. To meet this need, model records were obtained from the North-Eastern Poultry Producers

Council (NEPPCO) and adapted to the needs of the study and requirements of Nigerian conditions.

The NEPPCO records possess two distinct characteristics that recommended them for this work: (1) they provide a standard method for keeping records so that they are comparable between breeds on a like basis; and (2) the record-keeping forms are set-up so they yield directly the performance criteria noted above. The records are kept on a 28-day basis (4 weeks) providing a standard period unaffected by the irrationalities of the Gregorian calendar. There are 80 weeks in the chicken's life, divided into 20 periods of which 15 are productive.

By setting an upper limit of five farms per worker the staff of five was able to handle 25 farms. These farms were selected within their stratum by simple random sampling. In fact 28 farms were drawn, the excess being used as contingency farms on the assumption that some farms would refuse to cooperate or drop out during the course of the study when it would be too late to start new ones. One large farm in Abakaliki rejected participation after first agreeing to cooperate. A second farm in Umuahia went out of business after the first month. A third sold-off its single flock of growers in the second month to concentrate upon a hatchery enterprise and two others lost interest in the project after three months. These two farms kept records but spoiled them with indifference and by mixing the studied

Distribution of Producers appearing on the Survey
of one-third - Phase I

| Province | 100-300 | 301-500 | 501-700 | 701-1000 | 1000-4000 | 4000+ | Total |
|---------------|---------|---------|---------|----------|-----------|-------|-------|
| Abakaliki | 8 | 3 | 1 | 1 | 1 | * | 14 |
| Annang | 3 | 1 | * | * | * | * | 4 |
| Enugu | 4 | 1 | 1 | 2 | 1 | * | 9 |
| Onitsha | 10 | 3 | 1 | 2 | 1 | * | 17 |
| Owerri | 13 | 3 | 2 | 1 | 1 | 1 | 21 |
| Port Harcourt | 9 | 3 | 1 | 2 | * | 2 | 17 |
| Umuahia | 19 | 4 | 2 | * | 2 | 2 | 29 |
| Uyo | 4 | 2 | 1 | 2 | * | * | 9 |
| Total | 70 | 20 | 9 | 10 | 6 | 5 | 120 |

Distribution of Farms by Scale and Province in
Phase II

| Province | Scale of Activity | | | Total |
|---------------|-------------------|---------|-------|-------|
| | Small | Mid | Large | |
| Abakaliki | 2 | 2 | 1 | 5 |
| Enugu | 2 | 1 | 1 | 4 |
| Onitsha | 1 | 2 | 1 | 4 |
| Owerri | 1 | * | 2 | 3 |
| Port Harcourt | 1 | 1 | 1 | 3 |
| Umuahia | 2 | 1 | 1 | 4 |
| Total | 9 | 7 | 7 | 23 |
| | - 300 | 301-900 | - 901 | |

flocks with alien fowl. These defections left the study with 23 farms. Two of these eventually damaged the records with a massive infusion of alien stock late in the study so that in fact only 21 farms with 33 flocks survived the study with usable record histories.

The poultry attendants were trained in keeping the records and a staff member visited each farm twice a week for the first month and weekly thereafter. On visits the enumerators would collect the old record and give out the new. A separate set of records was kept for each studied flock. To measure quantities of feed fed, a standard bucket was given to each farm. The bucket held 12.5 pounds of Pfizer feed and 16 pounds of MOA. The records indicated how many buckets were fed each day. They also indicated the number of eggs produced, by what number of hens, and further accounted for casualties among the flock due to death or culling.

In the three stratum 16 flocks were studied in the smallest group; 14 in the second and eight in the largest. As an effect of simple random sampling only one farm turned up from each of the two provinces - Annang and Uyo. As these were very remote farms, and the provinces themselves distant from the center of the study - these sites were replaced by farms in Owerri and Umuahia. Table A-3 shows the final distribution of farms in the six provinces.

The Selection and Training of Enumerators for Phase I and II

The same enumerators were used for the first phase and part of the second. These were six (but later five) third year students from the University of Nigeria-Nsukka. All but one were majors in the agricultural economics department. Three had worked with Anschel and Welsch in their field studies with the EDI in 1964. The criteria used for their selection was three-fold. First, experience or great interest in doing the work; second, being a native of the area into which they would be sent by the study; finally, that they be a student of the writer in the year following the survey.

The criteria of residence was used to overcome the problems of language. In Eastern Nigeria several major languages are spoken as well as a number of dialects of each, but English functions as a lingua franca. English is a useful medium of communication so long as the subject matter is not abstract or technical. In such instances it is best to use the respondent's native tongue to avoid ambiguity, confusion and error. Use of the language native to both respondent and enumerator was insisted upon.

A three day training period was used to prepare the enumerators for Phase I. An enumerator's handbook was written, sample questionnaires reviewed, the intent of the questions made clear and the purpose of the study discussed. Instruction was given on the techniques of interviewing:

how to probe, how not to lead, how to gain and maintain rapport. Trial interviews were held for one day. A local poultryman was employed to act as respondent and the enumerators interviewed him before the group. Several prepared scenarios were used to place the enumerators in different test situations both for experience and demonstration.

The work for Phase I took four weeks. At the end of the second week, the enumerators returned to Enugu to exchange experiences and work out problems encountered in the study. At the end of Phase I two days training was given in farm records. Phase II began on August 1, 1966. The students had to return to classes in late September so replacements had to be found to carry on the work for the final three months. The student enumerators trained their replacements starting September 1, 1966. Several follow-up trips were made to supervise and check the progress of the work. One enumerator did poor work in Phase I and II and his material had to be redone.

Before each phase and twice during Phase II, letters were sent to all farm owners on the sample list explaining the study to them and to give a progress report. Very good response was received from respondents in Phase I. Some larger producers said that they would not participate in Phase II, but the general level of enthusiasm and cooperativeness was heartening and remarkable. Each participating

producer in Phase II was promised in return for his help an appraisal of his poultry enterprise based on our findings and his ranking relative to other participants (Appendix E). Complete anonymity was of course guaranteed. At the end of Phase II enough farmers had become interested in the EDI record system that provision is being made to continue it on a wider scale throughout the region.

Each enumerator was given a detailed map of his area on which to plot the location of each farm visited in Phase I. The purpose of this exercise was three-fold:

1. to help in the selection of sample units for Phase II.
2. to plot the area distribution of producers.
3. as a check against fraudulent interview.

The enumerators contributed in large measure to the successful accomplishment of the field study.

Phase III - Consumer Survey

A sample was prepared from surveys done in four cities in Eastern Nigeria in December 1966. The objective of the survey was to gain some insights into consumer habits of persons at different levels of income and of egg consumption in particular. No time series on egg prices exist from which price elasticities could be calculated. However, income elasticities may be made if price and income information can be obtained

for the same moment in time. To gather such information this survey was made.

It was decided to gather 120 interviews from each of four cities, being 480 in all. This figure was a function of the size of the staff and time available. It was estimated that an enumerator could do up to five one hour interviews a day. However, only two weeks were available to do the survey as most of the enumerators were university students working over Christmas break. Each enumerator was presumed able to perform 40 interviews over the period and only 12 were available. The four cities were selected on the following criteria. Calabar was selected as the only substantial non-Ibo city in the region. Enugu is an administrative city where a higher income and better educated public was likely to be found. To represent typical traditional Ibo communities, Onitsha was selected. Finally, the region's major industrial city, Port Harcourt was added.

No reliable up-to-date census information exists with regard to these four cities. Likewise up-to-date maps are lacking. To cope with these deficiencies natives of the four cities were recruited to make two maps. Once done the residential areas are marked out and the characteristics of each district noted. The streets in each district were marked out and each compound along the street numbered and marked. The districts were attributed as being high, middle, or low

income. Such districts are not too hard to identify by virtue of their obvious housing differentials. For example, a district visibly reflects whether it is occupied by civil service and professionals, by business or commercial or by unskilled classes.

Half the sample units in each town were allocated to the low-income group and half of the balance were allocated to middle and high income groups respectively. The numerical proportion being 60-30-30. Enough units were wanted in each stratum to yield a good distribution. Each compound on all the streets of an income area was given a number and the sample units drawn by simple random sampling. Within the compound the enumerators were instructed to interview any family unit available. As it happened fewer households than usual were present within the compounds at the time of interview because many had returned to their home areas over the Christmas holidays.

Two enumerating groups were recruited. One, made up of university students, worked under the writer's supervision in Onitsha and Port Harcourt. The other, composed of part-time Federal Department of Statistics employees worked in Calabar and Enugu under Mr. U. Udosen. Enumerators were trained by their respective supervisor.

The consumption sample consisted of 480 urban sites provided a substantial replacement reserve. The final sample was 456 households reflecting shortfalls especially in the higher income group and a few spoiled enumeration sheets.

APPENDIX E

QUESTIONNAIRES USED IN GATHERING PRIMARY
DATA FOR THE POULTRY STUDY

1. Phase I

Questionnaire used to gather data on Entrepreneurship among
commercial poultrymen.

Schedule Number _____

If on a farm settlement check here _____

Farmer's Name _____

Address _____
Name of business, street, village, division, province

Name of Enumerator _____

Date and place of interview _____

Time at beginning of interview _____

Language in which the interview was done _____

GO THROUGH INTRODUCTORY COMMENTS

| TAB NO. | QUESTION NO. | QUESTIONS |
|---------|--------------|--|
| 1. | 1. | Are you the owner of this business?
Yes (1)
No (2) |
| | 2. | If no, what is your association with the firm?
_____ |
| | 3. | How old are you? _____ |

TAB NO. Q.NO.

| | | |
|----|-----|---|
| | 4. | What province and county council does your family come from? _____ |
| | 5. | If 4 is different from present address, how did you come to move? _____
_____ |
| | 6. | How long have you been at the present site?
_____ |
| 2. | 7. | How many years of education have you had?
0 1 2 3 4 5 6 7 8 9 10 11 12 (circle one) |
| 3. | 8. | How long have you been in the poultry business?
1 2 3 4 5 6 7 years (circle one) |
| 4. | 9. | Do you consider the poultry farm as your most important work?
Yes (1)
No (2)
If no specify _____ |
| 5. | 10. | How many hours do you devote to it daily?
1 2 3 4 5 6 7 8 hours (circle one) |
| | 11. | How much of your total income do you get from the poultry enterprise?
1. almost all
2. 3/4
3. 1/2
4. 1/4
5. almost none |
| | 12. | Now we would like your work history beginning with the most recent job. List periods of employment and unemployment prior to entering the poultry business.

Type of work or period of employment Duration in months
a. _____
b. _____
c. _____
d. _____ |

TAB NO. Q. NO.

13. What other jobs do you have now?
 a. _____
 b. _____
 c. _____
14. Where did you get the idea to enter the business?

 1. from friends or relatives
 2. from newspaper
 3. heard a public talk about it
 4. radio
7. 5. other (specify) _____
15. How long after you first heard of the business before
 you entered it?

8. 1. a month
 2. three months
 3. six months
 4. nine months
 5. a year
 6. more than a year
16. Why did you decide to start a poultry farm?

9. 1. I though it would be a good supplement to my income
 2. a good supplement to my pension
 3. the best investment of my money available
 4. I was dissatisfied with my job and wanted to
 become independent
 5. I had no job
 6. other (specify) _____
17. Where did you obtain the money to enter this business?

10. 1. from my family
 2. from personal savings
 3. from income or pension
 4. from loan
 5. other (specify) _____

TAB NO. Q. NO.

18. If a loan, what was the source?
11. 1. a bank
 2. government agency
 3. a friend
 4. family
 5. other (specify)_____
19. What were the general terms of the loans?
- a. name of loan if from government _____
 b. period to repay _____
 c. interest rate _____
 d. security offered _____
 e. has it been repaid now? _____
 f. other comments _____
20. Did you encounter any difficulties in obtaining a
 a government loan?
- 12a Yes (1)
 No (2)
 If yes, specify _____
12. 1. lack of personal influence
 2. favouritism shown to others
 3. could not meet requirements
 4. special favours asked of me
 5. lack of cooperation from officials
13. 6. other (specify)_____
21. Judging from your own experience, what were the most
 difficult problems to overcome when you entered the
 business? (you may check several, but not order of
 priority):
1. lack of experience in the business
 2. lack of money
 3. lack of knowledge of markets
 4. lack of chicks
 5. other (specify)_____

TAB NO. Q. NO.

22. What training program did you participate in?
15. 1. Abakaliki
 2. other poultry centre in Eastern Province
 3. Israel
 4. United Kingdom
 5. other (specify) _____
16. 23. Did you send your manager to a training program?
- Yes (1)
 No (2)
24. If answer to 22 is yes, specify which one _____
25. Which years have you attended the annual poultry
 conference at Nsukka?
1. 1963
 2. 1964
 3. 1965
 4. 1966 (if you intend to)
26. How much land do you have at the location of the
 poultry enterprise? _____
27.

| | RIR | WL | MIXED | OTHER | SUM |
|----------|-----|----|-------|-------|-----|
| Layers | | | | | |
| Growers | | | | | |
| Cocks | | | | | |
| Broilers | | | | | |
- In addition to these, do you have any:
- ducks _____
 turkeys _____
 other fowl _____
28. What was your egg production today _____
 this week _____
 this month _____
29. What do you consider to be your average production
 per hen? _____

TAB NO. Q. NO.

30. What type of housing do you use?
18. 1. specially constructed house _____
 2. adopted building _____
31. How much did it cost? _____
- Who built it? _____
 How long do you think it will last? _____
 How many birds will it house? _____
32. Where do you buy your chickens?
19. 1. Abakaliki _____
 2. Thornber _____
 3. PAC _____
 4. Lincolndale _____
 5. other (specify) _____
33. What age chick do you buy?
20. 1. day old _____
 2. week old _____
 3. point of lay _____
34. Are you satisfied with the quality of chick that
 you are getting?
21. Yes (1)
 No (2) If no, why? _____
22. 1. undetermined breed _____
 2. high mortality? _____
 3. poor growth _____
 4. poor service by supplier _____
 5. poor production by layers _____
 6. other (specify) _____
35. How do you decide when to replace your laying
 flock? (specify) _____

TAB NO Q. NO.

36. How do you get your feed?
23. 1. produce on your farm _____
 2. obtain from M. O. A. _____
 3. buy in open market _____
 4. obtain from Pfizer _____
37. Do you have to fetch the feed yourself?
24. Yes (1)
 No (2)
38. What do you pay per bag at feed store? _____

 If delivered to you, how much do you pay per bag? _____
39. Do you use different feeds for layers, growers,
 broilers?
25. Yes (1)
 No (2)
40. (a) If you are not satisfied with the feed you are
 using, why?
26. 1. cannot get it when I need it _____
 2. unconstant quality _____
 3. poorly packed _____
 4. other (specify) _____
- (b) How far are you from your feed source? _____
- (c) What is the mix ratio you use if you mix market
 maize with a commercial concentrate? _____

41. What member of your family work in the poultry enterprise
- | Relationship | Hours per week | Pay Rate |
|--------------|----------------|----------|
| Children | | |
| Wives | | |
| Others | | |



TAB NO. Q. NO.

42. Other than family members, how many persons
do you employ for the poultry enterprise?

| | No. | Hours per week | Meals | Pay per week |
|-----|-----|----------------|-------|--------------|
| 27. | 1 | | | |
| | 2 | | | |
| | 3 | | | |
| | 4 | | | |

43. Why did you select the system of keeping layers
that you use?

28. 1. only one I knew about _____
2. I felt it best met my needs _____
3. couldn't afford any other _____
4. other (specify) _____

44. What do you use for litter? _____
When do you change litter? _____

45. What determines which birds you will cull?

a. physical condition _____
b. physical appearance _____
c. age _____

46. What method of culling (selecting non or low
producers) do you employ?

a. general appearance _____
b. colour of comb, ear lobes and legs _____
c. physical examination of pelvic region _____
d. age _____
e. other _____
f. none used _____
g. Do you employ someone else to cull for you ?

Yes (1)
No (2)

| TAB NO. | Q. NO. |
|---------|--------|
|---------|--------|

47. Do you debeak?

Yes (1)

No (2)

What do you do about other vices?

a. egg eating _____

b. cannibalism _____

c. other (specify) _____

48. How often do you cull?

29. a. never _____

b. on a regular basis _____

c. whenever I see a likely bird _____

d. other (specify) _____

49. How often do you collect eggs?

30. 1. once daily _____

2. twice daily _____

3. more than twice _____

50. Where do you store eggs?

a. in a cool room _____

b. wherever convenient _____

51. What diseases have your flock been vaccinated against?

1. Newcastle _____

2. Fowl Pox _____

52. a. What problems do you have obtaining veterinary services?

(specify) _____

b. How often does the veterinary

deworm? _____

delouse? _____

33. Yes (1) No (2) - exclude Alien fowl _____

d. old feed bags

4

39. What are they?

| TAB NO. | Q. NO. | |
|---------|--------|--|
| | 59. | How do you dispose of your eggs? |
| 40. | | 1. I sell them to local merchants_____ |
| | | 2. I have a contract_____ |
| | | 3. to whomever comes to my door_____ |
| | | 4. keep them for hatching_____ (number in) |
| | | 5. use for hatching_____ (order of) |
| | | 6. market scheme_____ (importance:) |
| | | (1, 2, 3, 4, 5) |
| | 60. | a. Do you grade your eggs? |
| 41. | | Yes (1) No (2) |
| | | b. How? |
| | | 1. appearance (size) |
| 42. | | Yes (1) No (2) |
| | | 2. weight |
| 43. | | Yes (1) No (2) |
| | | 3. colour |
| 44. | | Yes (1) No (2) |
| | 61. | Do you take any steps to preserve the internal quality of your eggs? |
| 45. | | Yes (1) No (2) |
| | | What are they? _____ |
| | 62. | How long do your eggs stay at the farm before they are moved out? |
| 46. | | 1. less than a day_____ |
| | | 2. a day_____ |
| | | 3. other (specify)_____ |

| TAB NO. | Q. NO. |
|---------|--------|
|---------|--------|

- | | | |
|-----|-----|---|
| | 63. | How do you price your birds before sale ?
On the basis of: |
| 47. | | 1. weight _____
2. age _____
3. cost of production _____
4. other (specify) _____ |
| | 64. | What price do you normally receive (or charge)
for your poultry?

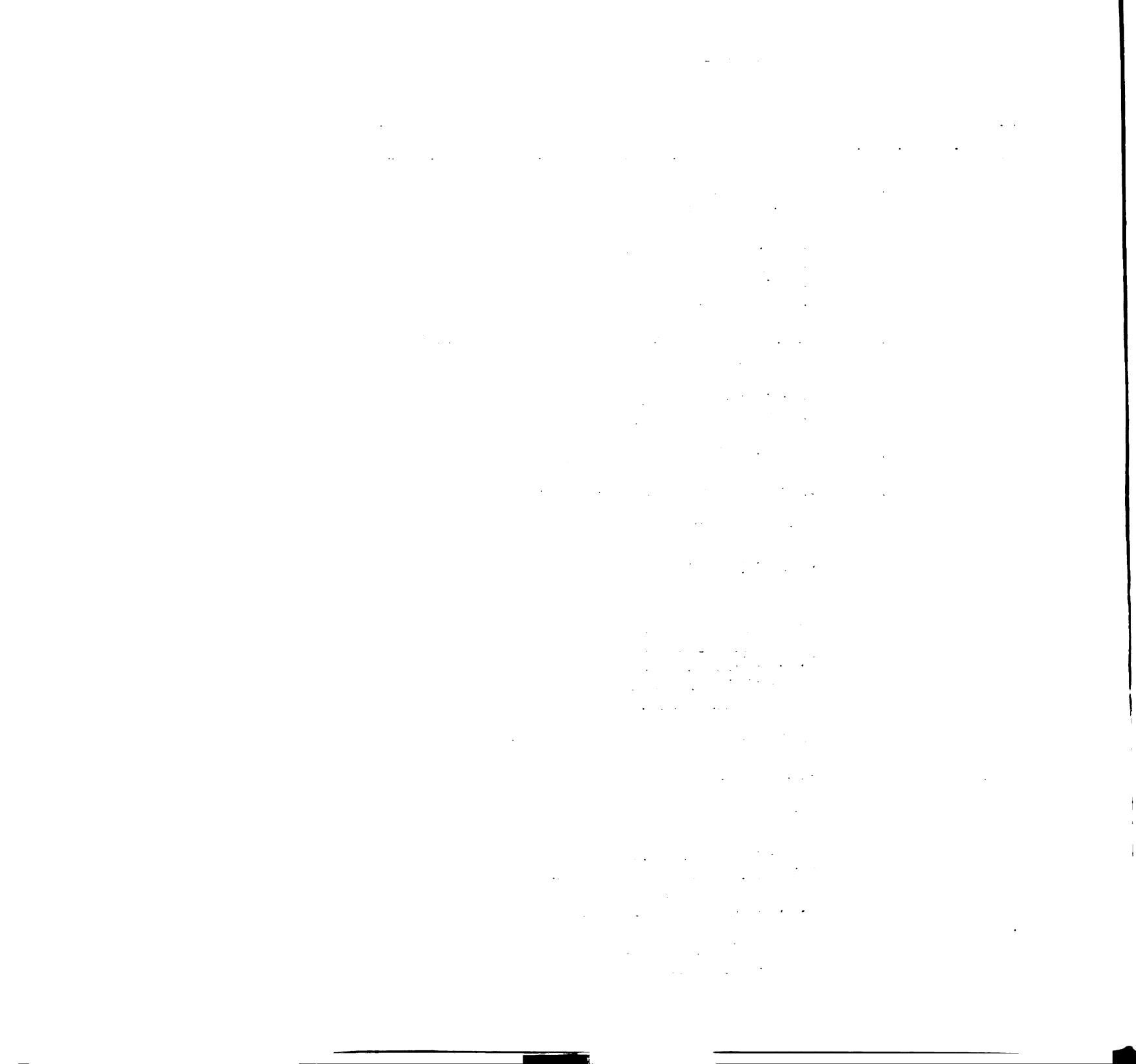
1. per head _____
2. per pound _____ |
| | 65. | How far is it to your market? _____ |
| | 66. | a. Do you have contracts to sell poultry |
| 48. | | Yes (1) No (2)

Where? (check)

university _____
college _____
hospital _____
E. N. D. C. _____
wholesaler _____
retail shop _____ |
| | | b. Do you have contracts to sell eggs? |
| 49. | | Yes (1) No (2)

Where? (check)

university _____
college _____
hospital _____
E. N. D. C. _____
hotels _____
wholesaler _____
retail shop _____ |



TAB NO. Q. NO.

67. During the past 12 months, what has been:
1. your lowest price for poultry_____ which month? _____
 2. your highest price for poultry_____ which month? _____
 3. your lowest price for eggs_____ which month? _____
 4. your highest price for eggs_____ which month? _____
68. How much does it cost you to transport your eggs
to the market? _____
69. Where do you sell your eggs most of the time?
- a. local market _____
 - b. at the farm (do you have a sign board?)

Yes (1) No (2)
 - c. a buying agent (name _____)
 - d. large shops/hotels in town _____
 - e. local retailer _____
70. Where do you sell your poultry most of the time?
- a. local market _____
 - b. at the farm (do you have a sing board?)

Yes (1) No (2)
 - c. a buying agent (name _____)
 - d. large shops/hotels in town _____
 - e. local retailer _____
71. What changes would you like to see in your present
market arrangements?
- _____
- _____
- _____
- _____

TAB NO. Q. NO.

72. What prices do you charge per dozen eggs in
different markets?

| | Farm Price in | Price to | Price to | Contract |
|----------|------------------|----------|-----------|----------|
| Grades | Price Local Mkt. | Retailer | Wholesale | Price |
| Extra | | | | |
| large | | | | |
| Large | | | | |
| Medium | | | | |
| Ungraded | | | | |

73. What producers or marketing cooperatives are you
a member of? _____

74. What has been your experience with competition from
government eggs in marketing? _____

75. Give us the names and addresses of poultry farmers
who have gone out of business: _____

50. 76. Do you plan to stay in the business?

Yes (1) No (2)

If no, why not? _____

51. 77. Are you sorry you entered?

Yes (1) No (2)

If yes, why? _____

_____ Check if farmer is willing to participate
in Farm Management Project

TIME AT END OF INTERVIEW: _____

2. Phase II

Farm Management Records Employed by the Poultry Study.

Form one - used during the first contact with the prospective farm study site.

Form two - prepared and collected weekly from farms having studied grower flocks; from a form three type weekly summary.

Form three - the weekly summary collected every 8-10 days from the farm site.

Form four - prepared from the weekly summaries at the end of each four week period.

1. Farmer's Name _____

3. Flock number _____ House number _____ pen number _____

| | |
|---------------|-----------------------|
| if home made, | ration and proportion |
|---------------|-----------------------|

7. Hatchery of origin

8. Number of birds purchased

9. Number of birds at start of record

10. Age in days at beginning of record _____

11. Estimated sales value of the flock now

12. Value of your house _____ Age of house _____
Construction materials used _____

13. List all equipment present in the house

| Description | price | material | age |
|-------------|-------|----------|-----|
|-------------|-------|----------|-----|

14. Name of nearest extension man and address

15. Distance to his office

FORM TWO

Schedule No. _____ Date of hatch _____
House _____ Type of bird _____
Flock _____ Pens _____ Housing _____
Hatchery _____

COST OF RAISING PULLETS

| Date period ended | Cost of Chickens | | | Sale of Culls | | | Net Cost |
|---------------------|------------------|-----------------|-------------|---------------|----------------|-----------------------|----------|
| | No. of chickens | per chick price | Total Costs | No. Sold | Per cull Price | Total income | |
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| Net chickens housed | | | | | | Total cost of Pullets | |

FORM THREE

Period

Code

Type of Bird

Hatch Date

Farm

House

Hens Housed

Flock

Pen

WEEK NO.

WEEKLY SUMMARY

| Date | Days of Week | Days of Age | | | | Eggs Collected | | Total per Day | Hens on | | | Pounds Feed Used | | Total per Day | Remarks |
|------|--------------|-------------|---|---|---|----------------|--------|---------------|---------|------|------|------------------|--|---------------|---------|
| | | 1 | 2 | 3 | 4 | Added | Culled | | Died | Hand | Mash | Other | | | |
| | Fri. | | | | | | | | | | | | | | |
| | Sat. | | | | | | | | | | | | | | |
| | Sun. | | | | | | | | | | | | | | |
| | Mon. | | | | | | | | | | | | | | |
| | Tue. | | | | | | | | | | | | | | |
| | Wed. | | | | | | | | | | | | | | |
| | Thu. | | | | | | | | | | | | | | |

All figures are for the end of the day

Totals

FORM FOUR

Schedule No. _____ Date of Hatch _____ Period _____
Farm _____ Type of Bird _____ Weeks _____
House _____ Flock _____ Pen _____ Housing _____

PERIOD SUMMARY

| Average
Weekly
Days | Total
Eggs
To Date | Total
for
Week | Number of Hens | | | Pounds
Feed
Used | Cost
of
Feed | Remarks |
|---------------------------|--------------------------|----------------------|----------------|--------|------|------------------------|--------------------|---------|
| | | | Added | Culled | Died | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

Totals _____ The Single Period Summary _____

3. Phase III

Questionnaire used to gather consumer data from four cities in Eastern Nigeria.

NUMBER OF INTERVIEWER _____ DATE OF INTERVIEW _____

TIME STARTING _____ TIME ENDING _____

TOWN _____ AREA OF TOWN _____

LOCATION OF INTERVIEW _____

LANGUAGE _____

Respondent:

1. Expatriate

2. African

Sex of Respondent:

1. Male

2. Female

1. We are interested in learning what foods you eat and how often you eat them. (0, never; 1-several times a year; 2-once a month; 3-several times a month; 4-once a week; 5-several times a week).

| ITEM | FREQUENCY | | | | | |
|-------------------|-----------|---|---|---|---|---|
| Gari | 0 | 1 | 2 | 3 | 4 | 5 |
| Fermented Cassava | 0 | 1 | 2 | 3 | 4 | 5 |
| Yam | 0 | 1 | 2 | 3 | 4 | 5 |
| Fresh Fish | 0 | 1 | 2 | 3 | 4 | 5 |
| Stockfish | 0 | 1 | 2 | 3 | 4 | 5 |
| Maize | 0 | 1 | 2 | 3 | 4 | 5 |

| ITEM | FREQUENCY | | | | | |
|------------------|-----------|---|---|---|---|---|
| Goat | 0 | 1 | 2 | 3 | 4 | 5 |
| Pork | 0 | 1 | 2 | 3 | 4 | 5 |
| Beef | 0 | 1 | 2 | 3 | 4 | 5 |
| Chicken | 0 | 1 | 2 | 3 | 4 | 5 |
| Chicken eggs | 0 | 1 | 2 | 3 | 4 | 5 |
| Rice | 0 | 1 | 2 | 3 | 4 | 5 |
| Peppers | 0 | 1 | 2 | 3 | 4 | 5 |
| Green Vegetables | 0 | 1 | 2 | 3 | 4 | 5 |
| Dried beans | 0 | 1 | 2 | 3 | 4 | 5 |
| Guinea eggs | 0 | 1 | 2 | 3 | 4 | 5 |
| Beer | 0 | 1 | 2 | 3 | 4 | 5 |
| Hard liquor | 0 | 1 | 2 | 3 | 4 | 5 |
| Guinea corn | 0 | 1 | 2 | 3 | 4 | 5 |

We are especially interested in learning about the egg and chicken eating habits in your household. (We shall define household as the people who eat from your pot).

2. How many chicken eggs are consumed in your household?

a week _____
a month _____
a year _____

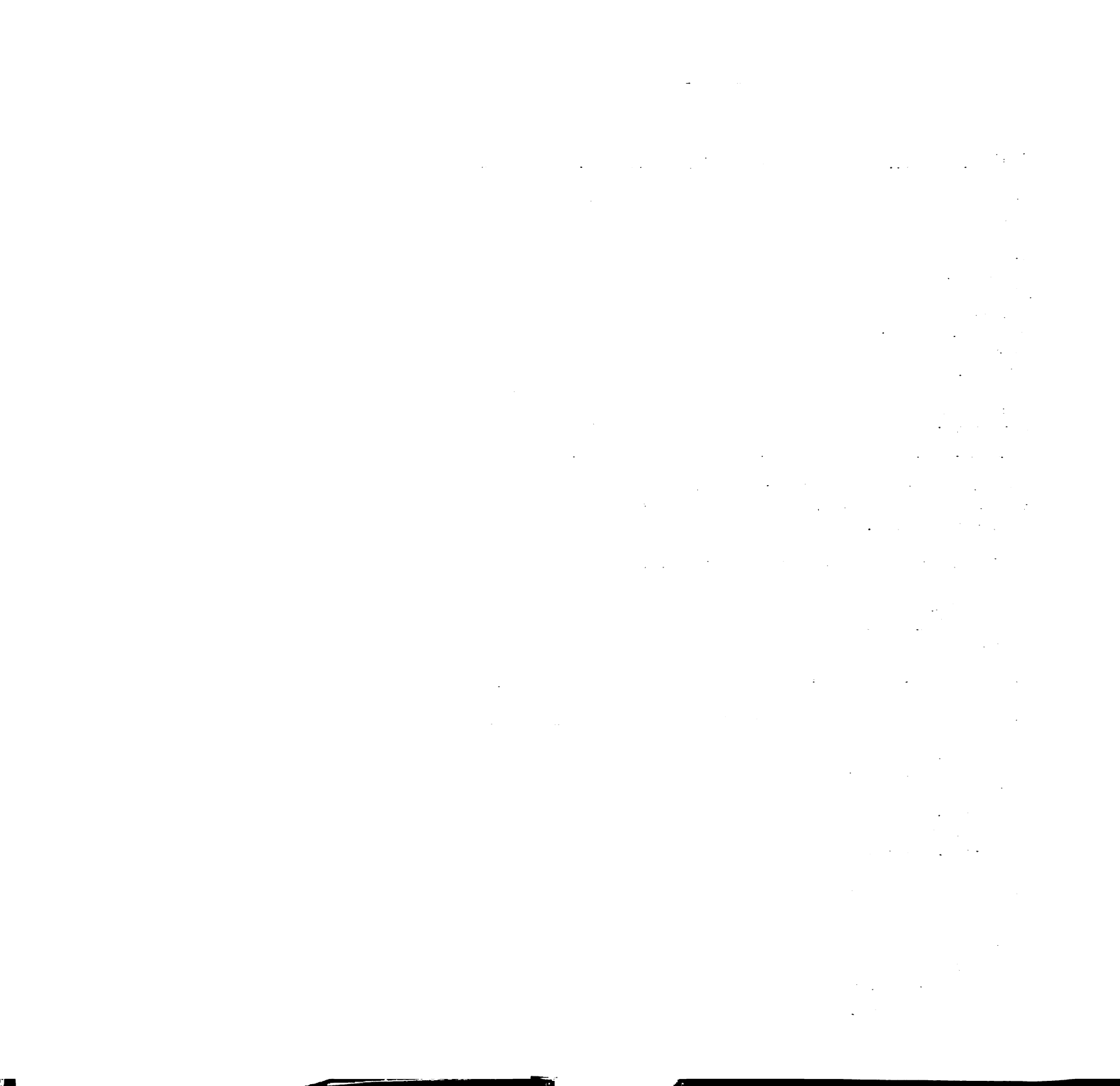
3. How many eggs do you usually buy at a time? _____

4. How frequently do you buy chicken eggs? _____

0 never
1 several times a year
2 once a month
3 several times a month
4 once a week
5 several times a week

5. Where do you usually buy chicken eggs?

1 local hawker
2 local market
3 cold store
4 direct from far
5 other (specify) _____



6. How many eggs did you buy the last you bought them _____
7. How much did you pay for them? _____
8. Where did you buy them? _____
9. Do you have any hens? _____ How many _____
10. How many hens do you have now? _____
11. How many eggs did you get from the last week? _____
12. Why don't you eat more chicken eggs?

1. Price generally too high
2. Unappealing flavour
3. Religious restriction
4. Social restriction
5. Others _____

Specify in each case _____

13. Why do you think many people may not like eggs?

1. Price generally too high
2. Unappealing flavour
3. Religious restriction
4. Social restriction
5. Others _____

Specify in each case _____

14. Why do you think eggs may be especially good for you _____

15. Which members of your household do not eat eggs?

(Check all applicable!)

1. men
2. women
3. boys
4. girls
5. babies

16. Why do they not eat them? (Specify) _____

17. In what different ways do you prepare eggs?

_____ boil in shell (Rank in decending order of
use 1, 2, 3 !)

_____ cook out of shell

_____ use as ingredients for other foods

18. Do you usually eat your eggs with meals?

0 no

1 yes

19. If no, where and when do you usually eat them? (Specify) _____

20. Do you ever eat Guinea eggs with your meals?

0 no

1 yes

21. When does your family eat chicken?

0 never

1 several times a year

2 once a month

3 several times a month

4 once a week

5 several times a week

22. Where do you usually get the chicken you eat?

1. Hawker

2. Market

3. Cold store

4. From farmers

5. Your own flock

23. Do you usually buy them alive?

0 no

1 yes

24. What price did you pay for the last chicken you bought? _____

25. What size was it?

larger _____
medium _____
small _____

26. What price do you usually pay for chicken? _____

27. How many chickens does your family eat?

1. In a week _____
2. In a month _____
3. In a year _____

28. What proportion of the chicken you eat in a year do you raise yourself? _____

29. On what occasion does your family usually eat chicken? _____

30. Why do you think some people do not eat chicken? _____

31. Have you ever bought slaughtered and dressed poultry meat?

Yes _____ No _____

32. If No, why?

1. Rather too costly
2. Not available when wanted
3. Not as good as live bird
4. The meat is too soft
5. Any other reasons, explain _____

33. If you buy your eggs and/or chicken from stores most of the time, which store do you buy from most of the time _____

34. Which store or stores do you buy from at any other future? _____

35. Why do you buy from the first store most of the time?

1. It has the best products
2. Provides best services
3. It is here I buy most of my things
4. It stands at the most convenient spot in town
5. It is the most popular shop in town
6. I do not know any others selling such products
7. It has cheapest prices
8. Any other? (Specify) _____

36. What is the highest grade of school your husband/wife reached?

37. Are you always satisfied with the quality of the egg you buy?

Yes _____ No _____

38. If No, what is usually wrong (Explain fully) _____

39. If Yes, what in your own opinion is a good egg? (Please explain fully). _____

This has been most helpful. Now we would like to get an idea of your food budget.

40. How much did you spend for all food last week? _____
last month? _____

41. How many people do you feed from your pot? _____

42. How many men? _____
women _____
boys _____
girls _____
babies _____ Total _____

43. Of your total family income money? every month, what part is spent on food? _____

We are almost done now, we would just like to have a little general information about your family. As we said before, this information will be used together with nearly 500 other persons, nothing specific about you will ever be mentioned. We haven't even asked your name!

44. In which province or county were you born? _____

45. What is the highest grade of school you have reached? _____

46. How many wives does your husband have? _____

47. What job does your husband have?

Government _____

Private firm _____

Self-employed _____

48. If he works for the government, what is his position? _____

- a. How many years has he been with the government? _____

49. If he works for a private firm, in what capacity? _____

- a. How many hours per week does he work? _____

- b. How long has he been with the firm? _____

50. If he is self-employed, what sort of work does he do? _____

51. If other members of the household unit earn income, please specify:

| <u>Member</u> | <u>his/her job</u> | <u>monthly wages</u> |
|---------------|--------------------|----------------------|
|---------------|--------------------|----------------------|

| | | |
|-------|-------|-------|
| _____ | _____ | _____ |
|-------|-------|-------|

52. What is the estimated monthly income for your whole household?

Thank you for your help _____

Time Ending _____

APPENDIX F

ESTIMATION OF FEED CONSUMPTION BY
LAYER AND GROWER FLOCKS IN
EASTERN NIGERIA 1/

This is an estimate of the annual feed output necessary to support the commercial poultry flocks in 1968 if the present high rates of chick production are continued - especially by the Regional Poultry Center. These estimates are based on data developed by the EDI survey of the economics of commercial egg production in Eastern Nigeria.

The figures are estimated from projections of monthly inventories of hens, and grower flocks multiplied to yield an annual figure. Thus each month, there will be some 171,000 layers of all ages, each consuming about 1.8 pounds of ration. Similarly, there will be approximately 112,000 chicks, unsexed to be supported each month. The survey indicates that a pullet consumes 24 pounds of feed over a five-month period whilst a cockerel will be fed half as much if it is sold-off at twelve weeks.

These estimates of the expected commercial chicken population of Eastern Nigeria and the quantities of feed they will consume are based upon several assumptions:

1/ Report prepared for Arthur D. Little & Co. by the author regarding the prospect for a second commercial feed mill in Eastern Nigeria.

1. That the hatcheries continue to produce at the following average monthly rates: 26,000 unsexed chicks (MOA alone produces at a rate of 250,000 per year), and 7,000 sexed chicks.
2. That layers live 80 weeks, 58 of these productive ones. A grower will consume 24 pounds of feed and a layer 94 pounds during the course of its life. This level of feeding is a function of management and is not significantly affected by the type of bird fed. Managers feed on the average 1.8 pounds of feed per week per layer - but this mean embraces a wide deviation from .9 - to an unbelievable 3.6 pounds per week.
3. That 20 percent of the initial chicks hatched do not reach maturity, and that 50 percent of the initial hatch are males. I assume that only 40 percent of the hatches actually become point of lay pullets from the unsexed chick rate.
4. That 80 percent of the point-of-lay pullets will reach 80 weeks of age.
5. That the self-hatched and imported chicks represent no more than a 10 percent increase over the number of chicks listed in point one above.

Estimated feed consumption: (all in short tons) per month:

| | |
|------------------|------------------------------|
| <u>per month</u> | 226 tons for pullets |
| | 666 tons for layers |
| | <hr/> |
| | 892 tons of ration per month |

| | |
|------------------|------------------------|
| <u>per annum</u> | 2,712 tons for pullets |
| | 7,990 tons for hens |
| | <hr/> |
| | 10,702 tons annually |

to support an average monthly population of 171,000 layers and 112,000 chicks and growers.

Outlook - If the past is any reliable guide to the future; 1968 will see (1) considerable over-production of eggs if hens are fed a proper ration; or (2) a considerable feed shortage leading to very low egg production due to severe under-feeding. Of these two alternatives the latter would appear the more likely.

If each hen lays 160 eggs per annum, 171,000 hens will lay two and a quarter million dozen eggs. This figure was approximated in 1964 when severe pressure was put upon the absorptive capacity of the market. Incomes and tastes have not undergone much change since then - neither have production costs. The effect upon producers profitability is clear.

It is hard to say what the annual production is in the region - however, combined current production of poultry ration is less than 6,000 tons. Indeed, it is admitted and lamented that the region has been hard-pressed to supply the smaller population of the near-recent and present.

Total Annual Feed Production In
Eastern Nigeria

| In short tons | 1963 | 1964 | 1965 | 1966 | Estimate 1968 |
|---|---------|---------|---------|---------|---------------|
| Approximate
Total | 1,100 | 4,000 | 4,500 | 5,500 | 10,702 |
| Number of day-
old chicks pro-
duced by all
hatcheries | 143,429 | 369,068 | 116,741 | 250,711 | 396,000 |
| Pounds per bird
produced | 15 | 21 | 81 | 44 | 50 |

The very large number of birds hatched in 1964 had to be supported in 1965-66, which period is remembered as one of severe feed shortages. It should be recalled that this was a period when trade moved unimpeded across regional boundaries. It was estimated that at that time only some 1 percent of the maize used in ration derived from regional production, the balance coming from the maize-growing middle-belt. With this source now in question, how will the layer-hen population be provided?

With regard to the presence of a market for a new mill, it must be noted that at the present time the industry is divided into two portions. One center's upon Enugu and is supplied by the MOA mill. The second is the other high income area - Port Harcourt. These latter producers rely mainly upon Pfizer for their feed. The high costs of transporting

low-value feed gives each firm a comparative advantage in its area.

A third mill would have to capture one of these two markets. Better, a new miller could usefully arrange a contract with the MOA to perform the latter's function in the milling business. Whether a subsidy arrangement would be continued would of course be open to question. However, to this viewer it seems that the government may be reluctant to carry the feed subsidy burden much longer in view of the sharply mounting claims against its resources.

APPENDIX G

SUPPLEMENTAL TABLES

Table G-1

Distribution by Province of Commercial Poultrymen*

| Province | M. O. A. List | Veterinarian List |
|-----------------------|---------------|-------------------|
| Abakaliki | 34 | 31 |
| Annang | - | 15 |
| Calabar ^{1/} | 16 | - |
| Degema ^{1/} | 16 | - |
| Enugu | 45 | 28 |
| Onitsha | 60 | 39 |
| Owerri | 40 | 66 |
| Ogoja ^{1/} | 11 | - |
| Port Harcourt | 25 | 44 |
| Umuahia | 35 | 77 |
| Uyo | 34 | 26 |
| Yenagoa ^{1/} | - | - |
| Total | 316 | 326 |

^{1/} Not included in this study.

* MOA list provided by MOA staff - livestock section from reports made by extension workers. The veterinarians' list was compiled by poultry project staff preparatory to drawing up research program in April 1966.

Table G-2

Total Annual Output of Chicks up to December 1966 in
Eastern Nigeria by Commercial and Public
Hatcheries

| Year | MOA | Lincolndale | Ejinaka
&
Thornber | Other* | Total |
|-------|---------|-------------|--------------------------|--------|---------|
| 1961 | 29,633 | - | - | - | 29,633 |
| 1962 | 62,731 | - | - | - | 62,731 |
| 1963 | 143,429 | - | - | - | 143,429 |
| 1964 | 328,776 | 28,292 | - | 12,000 | 369,068 |
| 1965 | 28,241 | 76,500 | - | 12,000 | 116,741 |
| 1966 | 108,491 | 41,946 | 88,274 | 12,000 | 250,711 |
| Total | 731,301 | 146,738 | 88,274 | 36,000 | |

* No records have been kept by PAC & Chukwurah, but shortages of hatchery eggs and maximum capacity lead me to guess at no more than 2,000 day-old chicks per month.

Compiled by author from records provided by the firms.

Table G-3

Array of Basic Data Used

| Farm | Flock | Pounds
per doz.
Eggs | Percent
Prod. | Eggs per
hen/week | Percent
Mortality |
|---------------|--------------|----------------------------|------------------|----------------------|----------------------|
| <u>Large</u> | | | | | |
| 101 | WL | 5.1 | 48 | 3.5 | 30 |
| | WL | 15.5 | 25 | 1.0 | - 0 |
| 301 | RIR | 7.8 | 43 | 3.0 | 13 |
| 309 | Hyline | 6.0 | 43 | 2.7 | 22 |
| 513 | Hybrid (404) | 5.4 | 70 | 4.8 | 9 |
| 520 | MOA-RIR | 4.0 | 54 | 3.0 | 10 |
| 605 | Hyline | 6.0 | 75 | 5.0 | 13 |
| 614 | RIR | 7.5 | 38 | 2.6 | 0 |
| | WL | 14.0 | 39 | 2.2 | 2 |
| <u>Middle</u> | | | | | |
| 102 | Hybrid(404) | 5.5 | 68 | 4.2 | 17 |
| 110 | MOA-RIR | 5.5 | 75 | 3.8 | 50 |
| | WL | 5.2 | 48 | 3.3 | 20 |
| 112 | WL | 5.3 | 47 | 3.0 | 25 |
| | WL | 9.1 | 30 | 2.2 | 2 |
| 509 | Hybrid (404) | 14.4 | 40 | 2.2 | 0 |
| 714 | Hybrid (404) | 4.3 | 65 | 4.5 | 2 |
| | Hybrid (404) | 6.1 | 70 | 4.5 | 3 |
| 716 | RIR | 14.9 | 20 | 1.2 | 11 |
| <u>Small</u> | | | | | |
| 109 | WL | 4.2 | 64 | 3.9 | 8 |
| 303 | MOA-RIR | 7.0 | 30 | 2.3 | 15 |
| 306 | MOA-RIR | 9.1 | 50 | 3.1 | 0 |
| | Hybrid (404) | 6.2 | 60 | 3.5 | 1 |
| 408 | MOA-RIR | 14.4 | 35 | 2.2 | 18 |
| 602 | Hyline | 6.5 | 70 | 4.6 | 4 |
| 727 | Hybrid | 6.0 | 55 | 4.1 | 18 |

Hybrid - are used as all egg specialist - Hyline, 404, WL 18 flocks
 MOA-RIR - 5 flocks 4 more dropped out
 RIR - 3 flocks 3 more dropped out

Table G-4

Producers of Eggs possessing 100 or more birds by
Province: from the Veterinary Records

| Province | 100-300 | 301-500 | 501-700 | 701-1000 | 1000-4000 | 4000+ | Total |
|---------------|---------|---------|---------|----------|-----------|-------|-------|
| Abakaliki | 23 | 9 | 3 | 3 | 1 | - | 39 |
| Annang | 9 | 4 | 1 | - | - | - | 14 |
| Enugu | 15 | 3 | 3 | 5 | 2 | - | 28 |
| Onitsha | 28 | 7 | 5 | 4 | 4 | - | 48 |
| Owerri | 41 | 11 | 5 | 4 | 3 | 1 | 65 |
| Port Harcourt | 25 | 8 | 4 | 5 | 1 | 2 | 45 |
| Umuahia | 59 | 13 | 4 | 1 | 6 | 2 | 85 |
| Uyo | 10 | 4 | 4 | 6 | - | - | 24 |
| Total | 210 | 59 | 29 | 28 | 17 | 5 | 348 |

Distribution of Producers appearing on the Survey of
one-third - Phase I

| Province | 100-300 | 301-500 | 501-700 | 701-1000 | 1000-4000 | 4000+ | Total |
|---------------|---------|---------|---------|----------|-----------|-------|-------|
| Abakaliki | 8 | 3 | 1 | 1 | 1 | - | 14 |
| Annang | 3 | 1 | - | - | - | - | 4 |
| Enugu | 4 | 1 | 1 | 2 | 1 | - | 9 |
| Onitsha | 10 | 3 | 1 | 2 | 1 | - | 17 |
| Owerri | 13 | 3 | 2 | 1 | 1 | 1 | 21 |
| Port Harcourt | 9 | 3 | 1 | 2 | - | 2 | 17 |
| Umuahia | 19 | 4 | 2 | - | 2 | 2 | 29 |
| Uyo | 4 | 2 | 1 | 2 | - | - | 9 |
| Total | 70 | 20 | 9 | 10 | 6 | 5 | 120 |

Distribution of Farms by Scale and Province in
Phase II

| Province | Scale of Activity | | | Total |
|---------------|-------------------|--------|-------|-------|
| | Small | Medium | Large | |
| Abakaliki | 2 | 2 | 1 | 5 |
| Enugu | 2 | 1 | 1 | 4 |
| Onitsha | 1 | 2 | 1 | 4 |
| Owerri | 1 | - | 2 | 3 |
| Port Harcourt | 1 | 1 | 1 | 3 |
| Umuahia | 2 | 1 | 1 | 4 |
| Total | 9 | 7 | 7 | 23 |

Table G-5

Labour Inputs and Actual Monthly Wage (including
Meal) Bills on 21 Studied Farms

| Farm No. | Labour | | Total Wages | Farm No. | Labour | | Total Wages |
|----------|--------|--------|-------------|----------|--------|--------|-------------|
| | Hired | Family | | | Hired | Family | |
| 101 | 7 | 2 | £ 26 - - | 602 | 1 | 2* | £ 16 - - |
| 102 | 2 | 2 | 11 12 - | 605 | 2 | - | 9 - - |
| 109 | 1 | 3 | 6 - - | 614 | 1 | 2* | 2 10 - |
| 110 | - | 3 | 8 8 - | 714 | 5 | - | 17 10 - |
| 112 | - | 5 | 14 - - | 716 | 3 | - | 8 - - |
| 301 | 1 | - | 3 16 - | 727 | 1 | - | 4 - - |
| 303 | - | 3* | 5 - - | | | | |
| 306 | 1 | 5* | 4 - - | | | | |
| 309 | 5 | 1 | 14 10 - | | | | |
| 405 | 2 | 0 | 9 - - | | | | |
| 407 | 2 | 1 | 10 10 - | | | | |
| 408 | 3 | 1 | 18 4 - | | | | |
| 409 | 2 | - | 9 12 - | | | | |
| 509 | 1 | - | 4 3 - | | | | |
| 513 | 3 | 2* | 12 - - | | | | |
| 520 | 5 | 2 | 27 10 - | | | | |

* No wage given to family or food money

** Food bill is computed to be 10 d. per day per worker or 25/- per month.

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