

THESIS





This is to certify that the

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A TEACHING, RESEARCH AND EXTENSION PROGRAM

IN ANIMAL TECHNOLOGY FOR NORTHERN
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A TEACHING, RESEARCH AND EXTENSION PROGRAM IN ANIMAL TECHNOLOGY FOR NORTHERN THAILAND

By

Pleerote Pleumsamran

A THESIS

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

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ABSTRACT

A TEACHING, RESEARCH AND EXTENSION PROGRAM IN ANIMAL TECHNOLOGY FOR NORTHERN THAILAND

By

Pleerote Pleumsamran

These programs constitute the framework within which the Department of Animal Technology will provide for the rural livestock development in northern Thailand. The accomplishment of this effort depends on its organization and administration. However, there are some proposals to improve these programs.

Practical experienced persons should be utilized in the total teaching program. Coordination should be made between schools and institutions as part of the curriculum plan. The basic equipment and demonstration farm should be available to students. The number of animal scientists beyond the B.S. degree should be increased.

With appropriate financial support, equipment and well-trained animal scientists, the Department of Animal Technology should be able to expand the research program and make a major contribution to livestock improvement.

Competent livestock specialists must be employed to develop an effective extension program in all phases of animal production. It is also important to provide training courses for lay farm people to serve agriculture and improve their communities.

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INTRODUCTION

Thailand is a tropical country in Southeast Asia with a land area of about 51 million hectares. It is located between 5° and 21° N latitude and 97° and 106° E longitude. All of Thailand has a tropical monsoon climate, with clearly defined wet and dry seasons. There is little temperature variation throughout the year. Generally, Thailand has a rainy season from May to October, a cool season from November to February, and a hot season from March to May, except in the South where there is no cool season (Nuttonson, 1963) see Figure 1, Table 1, Table 2 and Table 3.

The population in 1974 was estimated at 41 million. Of the 41 million, about one-third are in the Central Plain including Bangkok, one-third in the Northeast, and one-third are in the North and South (Wagner, 1974).

The country is divided into four regions which are shown in Figure 2 and Table 4 (Nuttonson, 1963).

- 1. The North region;
- 2. The Central region or Central Plain;
- 3. The Northeast region; and
- 4. The South region.

The North is largely mountainous with forest. The principal crops are rice, tobacco, soybeans, groundnuts and fruit trees.

Broad Classification			Dr Sea	ry son					We Sea	et son		
General Classification		Co Sea	ol son			Ho Sea	ot son			Ra† Sea	iny son	
Meteorological Classification	N	NE Monsoon Season			1st Ma S	: Int onsoc easo	ter on on	S	W Mo Sea	nsoo son	n	2nd*
Months	November	December	January	February	March	April	May	June	July	August	September	October

*2nd Inter Monsoon Season.

Figure	1.	Climatic	seasons	of	Thailand.
inguie		CITINGCIC	36430113	01	ind i fana.

		Nasath	Cent	tral ^C	Sout	thern ^d
Range	Northern ^a	eastern ^b	(1)	(2)	(1)	(2)
Annual precip. (inches)	48-63	45-81	43-63	109-172	91-169	71-105
Annual mean rel. humidity (%)	71-75	68-73	64-76	74-78	77-83	78-82
Mean annual temp. (°F)	76-82	80-81	80-84	81	81	80-82
Abs. max. temp. (°F)	104-110	108-109	103-111	101	96	100-103
Abs. min. temp. (°F)	36-43	36-39	41-54	48	66	58-64

Table 1. Broad Climatic Characteristics of Thailand

^aNorthern = area from Uttaradit Province northward.

 b Northeastern = area to the north and east of Nakornrajsima.

 C Central = (1) Central Plain of Thailand from Uttaradit Province south to the head of the Gulf of Thailand; (2) Chantburi region on the eastern coast of Gulf of Thailand.

^dSouthern = (1) western coast of the peninsula south of Prachuabkirikhan; (2) eastern coast of the peninsula south of Prachuabkirikhan.

		Air	. Temperat	ure (°F)			Precipit	cation (Inc	ches)	
Month	Mean	Mean Maximum	Mean Minimum	Absolute Maximum	Absolute Minimum	Mean	Absolute Maximum in Month	Absolute Minimum in Month	Absolute Maximum in 24 Hours	mean no. of Days With Precip.
Jan.	70.5	85.1	56.1	92	43	0.2	2.3	0.0	1	0.7
Feb.	73.8	90.06	57.6	100	44	0.4	3.5	0.0	1	1.1
Mar.	78.6	94.6	62.6	103	52	0.5	2.7	0.0	1	1.4
Apr.	82.8	95.5	70.3	105	56	2.0	4.8	0.3	1	5.0
May	83.5	93.2	73.6	102	67	5.0	10.7	1.9	!	11.0
Jun.	82.2	90.1	74.1	66	66	5.2	13.6	1.3	1	14.7
Jul.	81.3	88.7	73.9	66	6 6	7.8	15.9	2.1	1	17.7
Aug.	81.1	87.4	73.8	95	68	9.1	13.3	3.3	!	19.8
Sep.	80.4	87.8	73.2	96	67	11.4	23.3	3.7	1	17.0
Oct.	79.2	87.6	70.3	95	57	5.1	12.6	1.7	!	9.4
Nov.	76.3	86.2	66.2	94	55	1.8	6.3	0.0	1	3.7
Dec.	71.2	83.5	59.4	92	46	0.4	0.9	0.0	;	1.2
Annual	78.4	89.2	67.6	105	43	48.9	n.a.	n.a.	1	102.7
Yrs. of Rec.	19	19	25	14	15	21	14	14	1	21

Note: n.a. = not available.

Average Temperatures and Precipitation, Chiengmai, Thailand (Latitude 18°47' N; Table 2.

		Air	· Temperat	ure (°F)			Precipita	tion (Inch	es)	
Month	Mean	Mean Maximum	Mean Minimum	Absolute Maximum	Absolute Minimum	Mean	Absolute Maximum in Month	Absolute Minimum in Month	Absolute Maximum in 24 Hours	mean no. of Days With Precip.
Jan.	66.0	81.3	52.3	88	36	0.4	2.9	0.0	ł	t I
Feb.	70.9	88.0	54.0	95	42	0.2	0.8	0.0	:	ł
Mar.	75.7	92.3	59.4	100	51	0.7	2.8	0.0	ł	!
Apr.	81.1	95.0	67.3	104	53	2.2	7.8	0.9	:	!
May	81.9	91.8	72.0	103	65	7.5	13.6	5.0	ł	:
Jun.	81.7	89.2	73.8	98	68	8.7	20.3	6.3	!	;
Jul.	80.4	87.3	73.6	97	68	10.4	16.4	5.3	:	1
Aug.	80.2	86.9	73.4	95	69	14.0	21.2	6.5	1	!
Sep.	80.1	87.4	72.3	95	6 6	9.6	19.2	6.5	;	;
Oct.	78.1	86.7	68.9	95	59	6.1	12.9	0.3	;	;
Nov.	74.1	83.8	64.2	92	50	2.1	3.9	0.1	1	:
Dec.	68.0	80.1	55.9	89	39	1.1	1.2	0.0	;	!
Annual	76.5	87.5	65.7	104	36	63.3	72.6	44.1	:	
Yrs. of Rec.	11	11	15	11	11	25	п	11	:	ł
Source:	Based Centr cover	on publi al Thai S ing all a	shed and ervice of vailable	unpublishe Statistic years from	d records s; and Met 1927 thro	of Roy eorolo	al Irrigat gical Depa	ion Departu rtment, Ro	ment of Thai yal Thai Nav	land; y;

Average Temperatures and Precipitation. Chiengmai. Thailand (Latitude 19°54' N: Table 3.

Geographical Zones	Territorial Regions	Provinces (Changwats)	Area (Sq. Mi.)
Northern	5	Chiengrai (Chiang Rai)	5,878
		Chiengmai (Chiang Mai)	8,860
		Nan	5,730
		Maa Hana Sama (Maa Hana Saa)	2,301
		Hate-Hong-Soft (Hate Hong Son)	5,900
		Lamphoon (Lamphon)	4,833
Northeastern	3, 4	Kalasin	2.028
	•	Khonkaen (Khon Kaen)	5,332
		Chaiyaphoom (Chaiyaphum)	3,747
		Nakornpanom (Nakhon Phanom)	3,747
		Nakornrajsima (Nakhon Ratchasima)	7,871
		Buriram	3,708
		Manasarakam (Mena Saraknam) Roj ot (Roj Et)	3,403
		KOI-EL (KOI EL)	2,439
		LUCI Sicabat	3 444
		Sakol Nakorn (Sakon Nakhon)	3,963
		Surin	3,556
		Nongkhaj (Nong Khaj)	2,907
		Udorn Thani (Udon Thani)	4,598
		Ubol Rajadhani (Ubon)	8,946
Central	1, 2, 6, 7	Bangkok (Phra Nakhon)	343
		Thonburi (Thon Buri)	142
		Kanchanaburi	7,518
		Kampaengpet (Kamphaeng Phet)	3,436
		Chantouri (Chanthaburi)	2,325
		Chalburi (Chan Buri)	2,09/
		Chainat	1,730
		Trat	1.077
		Tark (Tak)	5.274
		Nakorn-Navok (Nakhon Navok)	834
		Nakorn-Patom (Nakhon Pathom)	861
		Nakorn-Sawan (Nakhon Sawan)	3,778
		Nontburi (Nonthaburi)	250
		Patum Thani	592
		Prachuabkirikhan (Prachuap Khiri Khan)	2,422
		Prachinburi (Prachin Buri)	4,705
		Ayuthya (Ayutthaya)	990
		Picnit (Phichit) Péterrulak (Phiterrulak)	2,601
		Pitsanuloke (Phitsanulok) Pethuri (Phat Buri)	2 436
		Petchaboon (Phetchabun)	4,908
		Ravong	1,452
		Ratburi (Rat Buri)	1,983
		Lobburi (Lop Buri)	2.511
		Samut-Prakarn (Samut Prakan)	349
		Samut-Songkram (Samut Songkhram)	155
		Samut-Sakorn (Samut Sakhon)	342
		Saraburi (Sara Buri)	1,182
		Singburi (Sing Buri)	326
		Sukhothai	2,/12
		Supanduri (Supnan Buri)	2,015
		Angthong (Ang Inong) littaradit	2.983
		Uthai Thani	2,442
Southern	8, 9	Krabi	1,531
		Chumporn (Chumphon)	2,185
		I rang	1,922
		Namon-Sithamraj (Nakhon Si Ihammarat)	3,952
		naratiwart (naratniwat) Detteni	1,013
		Pang Nga (Phangnga)	1 630
		rany nya (rnanynya) Patalung (Phatthalung)	1,550
		Phuket	206
		Yala	1.895
		Ranong	1.381
		Songkla (Songkhla)	2,758
		Satool (Satun)	807

Table 4.	Geographical	and	Administrative	Divisions	of	Thailand
				0	•••	



Figure 2. Geographical and administrative division, weather stations and agricultural experiment stations of Thailand.

Double cropping is practiced. Also, teak production is one of the most important commodities of the economy in this region.

The Central Plain is the largest and economically an important area. The main crops are rice, sugar cane, tropical fruits and vegetables. Some parts of this region are mountainous or hilly and are largely forested. Much of the coastal area is swampy, with mangrove trees.

The Northeast region represents a large plateau slightly tilted toward the east. The greatest part of the plateau is covered with forest, jungle and grass plains. More cattle are raised here than elsewhere in Thailand. Rice is the important crop.

The South is a rolling mountainous peninsula. Rubber and coconut are the most important crops.

In Thailand nearly every farmer raises some livestock. The most important species are buffalo, cattle, swine and poultry. The diet of livestock is usually grass, straw, rice-husks and bran. These can be obtained at a reasonably cheap price. Approximately 50% of the rice-husks and 75% of bran production is used for animal feed (Lumduan, 1967).

Buffalo and cattle are used first for draft purposes and then slaughtered for meat at the end of their draft usefulness. The number of each class has been declining in recent years, a fact that may be related to the increase in mechanization. Cattle are also raised for milk. Native cattle tend to be small in size compared to European breeds but are well adapted to the environmental conditions of Northern

Thailand. Improvement in the growth rate and milk production of cattle has been obtained by introducing bulls for crossbreeding. Several breeds including Brahman, Santa Gertrudis, Holstein and German Brown, have been used to improve the nature of the cattle population. The stability of the buffalo population is related to the rate of reproduction. The calving rate appears to be between 30 and 35% but the evidence of this point is far from adequate (Harshbarger, 1974).

The number of cattle and buffalo raised in Thailand, when compared to the number consumed, indicates that some of the livestock must come from neighbouring countries. The movement of livestock from Burma into Thailand is well known and established trade has been developed over many years.

Some of the principal routes for cattle and buffalo movement into northern Thailand are indicated in Figure 3. It is estimated that more than 10,000 cattle and buffalo are probably entering northern Thailand each year (Falvey, 1977).

Throughout northern Thailand swine are raised for sale in the city and for rural markets. Many farmers buy young feeder pigs, fatten them and sell them to the Chinese population in the markets. In a relatively short period of time the native swine population has been changed by crossbreeding with the Large White, Duroc and Landrace breeds. Commercial units for swine production have increased in number under efficient swine management systems. The distribution of purebred and crossbred boars and gilts by the livestock stations and universities



Figure 3. Routes by which cattle and buffalo enter Thailand and the most common routes of travel in Thailand.

has been an important factor in improving the quality of swine both by small farmers and larger commercial units (Harshbarger, 1974).

Poultry are raised in a wider geographic area than swine and consumed by family units in rural areas. In recent years the production of chickens and ducks, both for eggs and meat, has advanced rapidly with the new technology provided through extension programs and private industry. Commercial units for the production of both broilers and eggs have increased in number and importance in providing a large proportion of the products distributed through the central markets.

Elephants play an important role in logging industry and are found mostly in the northern region. Those in captivity decreased from more than 13,000 in 1950 to about 11,000 in 1964. More recent figures are not available, but their numbers have probably declined in more recent years (Henderson, 1971).

Horses are used mainly as pack animals by the mountain people of the north and some are raised for racing.

Sheep and goats are considered to be unimportant and of no real significance in the Thailand economy. The reasons for this are associated with their low numbers, apparently low productivity, inadequate exploitation and lack of purposeful development.

The estimated total numbers of the major classes of domestic livestock in Thailand are shown in Table 5 (Anon, 1976).

Livestock	1970	1971	1972	1973	1974	1975	1976
Horses	172	171	170	169	168	167	167
Buffalo	5,642	5,735	5,821	4,930	5,942	5,947	5,379
Cattle	4,452	4,667	4,830	4,365	4,335	4,432	4,296
Swine	4,807	5,132	5,476	4,573	4,460	3,516	4,300
Ducks	6,975	7,109	7,194	7,281	11,078	12,697	12,000
Chickens	56,100	58,791	61,437	52,782	61,816	47,805	55,000

Table 5. Numbers of Livestock in Thailand (Thousands)

The national policy on livestock production as stated in the Third Year Plan policy is to accelerate production of beef cattle, water buffalo, swine, ducks and chickens both for internal consumption and for export. Good breeds of livestock will be promoted. Animal disease prevention and eradication work will be strengthened. Diseasefree and extension zones will be established. The existing marketing system will be improved.

The most important project is to increase beef production in order to provide sufficient meat for local consumption and for export at a rate of not less than 50,000 head per annum.

Some of the major limitations facing the livestock industry (Harsbarger, 1974) are as follows:

 The availability of land for cattle and buffalo production will be reduced as crop production expands.

- 2. Mechanization with tractors will reduce the demand for draft animals.
- 3. The marketing system does not allocate an adequate share of profits to the livestock producer.
- 4. The problems of breeding, disease control, feeding and transportation.

TEACHING PROGRAM IN AN ANIMAL TECHNOLOGY DEPARTMENT IN NORTHERN THAILAND

Present Status

This section will present the present status of the Department of Animal Technology, faculty of Agricultural Production, Institute of Agricultural Technology, Chiangmai, Thailand.

The Institute of Agricultural Technology was established in 1974. It is composed of Agricultural Production and Agricultural Business faculties. The Institute has the responsibility for education of students in technological agriculture awarding the degree of Bachelor of Science of Agriculture. The faculties of agriculture on four other campuses have a combined enrollment of 3,000 students who are pursuing a broad-based, "know-something-about-everything" curriculum in Upper Secondary Education (Grade 12). These graduates may best serve agriculture in research work, while the graduates of the Institute of Agricultural Technology should excel in practical agriculture helping rural peasants to engage in modern farming techniques.

At the present time, the Institute students are recruited only from graduates of the Technical agriculture program (Grade 15). This bachelor degree program is designed to permit selected graduates of two-year Technical Agriculture programs to continue their two-year B.S. program, after they have had practical farm experience. In the future the Institute may additionally recruit students graduating in

the Vocational Agriculture curriculum (Grade 13) into its four-year B.S. program. This would possibly start in 1982.

The general educational system of Thailand is organized at the following levels:

- 1. Lower Primary Education: Pathomsuksa 1-4 (Grades 1-4);
- 2. Upper Primary Education: Pathomsuksa 5-7 (Grades 5-7);
- 3. Lower Secondary Education: Mathayomsuksa 1-3 (Grades 8-10);
- 4. Upper Secondary Education: Mathayomsuksa 4-5 (Grades 11-12);
- 5. Elementary Teacher Training: Certificate (Grades 11-12);
- Vocational Education (Agriculture): Mathayomsuksa 4-6 (Grades 11-13);
- 7. Secondary Teacher Training: Certificate (Grades 13-14);
- 8. Technical Education (Agriculture): Job Entry (Grades 14-15);
- Institute of Agricultural Technology B.S. (two years from grade 15);
- 10. University: B.S. (four years from grade 12); M.S. (two years post B.S.); and D.V.M. (six years from grade 12).

The Department of Animal Technology of Chiangmai is organized into eight divisions:

1. Dairy

- 2. Beef
- 3. Swine
- 4. Sheep and goats
- 5. Poultry

- 6. Fisheries
- 7. Nutrition
- 8. Sanitation.

The regular employees of the Department in 1977 were distributed according to the following qualifications:

<u>D.V.M</u> .	<u>M.S</u> .	<u>B.S</u> .	<u>Certificate</u>
2	2	3	2

The estimated total numbers of livestock in the Department of Animal Technology from 1974 to 1977 are shown in Table 6.

Livestock	1974	1975	1976	1977
Buffalo	21	23	27	33
Beef cattle	78	89	102	114
Dairy cattle	25	31	40	45
Swine	96	109	120	135
Sheep-goats	65	79	82	94
Poultry	5,200	6,400	8,800	9,600

Table 6. Number of Livestock in Animal Technology Department

The undergraduate program of the Department of Animal Technology includes candidates for a B.S. degree in Animal Science with a major in Poultry Science, Dairy Science, Beef Science, Swine Science, Animal Nutrition and Fisheries. Enrollment in these curricula during the past three years has ranged from 25-30 with students in only Poultry Science. In the next three years enrollment will be completed in the six curriculum majors.

The requirements for the B.S. degree as offered by the Department of Animal Technology are shown in Table 7.

	Cr. Hr.	Percentage
Basic courses	10	13.3
Related courses	24	32.0
Major courses	30	41.0
Electives	6	8.0
Special problem	5	6.7

Table 7. Credit-Hours Required for B.S. Degree^a

^aSpecific courses are listed in Appendix A.

In addition to these requirements the students must complete work practice courses equivalent to about 500 hours of farm experience. This training is provided between semesters at private livestock farms or the university farms. The two-year bachelor's degree program (after the Technical Agricultural level) in the Animal Technology Department will produce a planned student output as shown in Table 8.

IUCAI	Poultry	Dairy	Beef	Swine	Nutrition	Fisheries
30	30					
30	30					
30	30					
50	25	25				
50	25	25				
125	25	25	25	25	25	
150	25	25	25	25	25	25
	30 30 30 50 50 125 150	30 30 30 30 30 30 30 30 50 25 50 25 125 25 150 25	30 30 30 30 30 30 50 25 25 50 25 25 125 25 25 150 25 25	30 30 30 30 30 30 50 25 25 50 25 25 125 25 25 25 150 25 25 25	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

Table 8. Planned Graduate Output, by Area, from Two-Year B.S. Program

The graduates in Poultry Science were reported to be all employed last year. Several are employed in private industry, but there has been some delay in filling government positions since the starting salaries may be too low to attract college graduates. The private sector offers higher salaries and more positions for Animal Science graduates. Banks providing credit to farmers, feed companies and agri-business firms have been employing an increasing number of graduates. Very few graduates have the opportunity to engage in farming directly because the capital required to established a commercial farming operation is not readily available.

Teaching Needs

1. The need for practical experience: A common weakness in all agricultural education programs is the lack of ability in practical applications. From studying of the background and experience of the students at each educational level, it appears that as the educational experience increases, the percent of students with rural background and farm experience decreases. The reason for the decrease in students with experience may be that entrance examinations at each level are academic and not practical in their orientation.

2. The need for facilities and equipment: Facilities and equipment play an increasingly important role as teaching and learning styles become more practical and applied.

3. The need for Ph.D. level manpower: At the present time, there is a shortage of animal scientists with training beyond the bachelor's level in the Department of Animal Technology. The Ph.D. level means a fully trained and mature scientific worker. The Department of Animal Technology needs are listed below by priority:

First Priority	<pre>1 Ph.D. Animal Nutrition 1 Ph.D. Poultry Management 1 Ph.D. Dairy Management 1 Ph.D. Food Science</pre>
Second Priority	<pre>1 Ph.D. Physiology of Reproduction 1 Ph.D. Beef Management 1 Ph.D. Swine Management 1 Ph.D. Fisheries Management</pre>
Third Priority	<pre>1 Ph.D. Animal Genetics 1 Ph.D. Food Science 1 Ph.D. Aquiculture 1 Ph.D. Ruminant Nutrition</pre>

The teaching people should also have research and extension responsibilities.

Proposed Teaching Program Improvement

1. Persons with successful practical experience (farmers, industry personnel, and other government specialists) should be utilized to supplement present instructional staffs on a regular, systemic and frequent basis.

2. Schools and institutions should coordinate the curriculum plan and teaching. The curriculum at all levels should be revised, so that rural students would have the opportunity to study agricultural practices from their school teachers and university (institution) teachers.

3. Entrance examination should be changed so that students with rural background and experience and an appreciation of agriculture could enter formal education in agriculture, particularly at the higher levels.

4. Having a demonstration farm from which students can move back and forth with greater frequency (between classroom and farm). There is a greater chance that they will understand and appreciate the relationships between theory and practice. Also, systems for student initiative and management of farming practices require that students can walk, not only to the classroom and library, but to their own farm plots as well.

5. The basic equipment should be available to students at the most convenient time. This usually means that equipment such as field tools, live animals and textbooks need to be continuously available to students. Also, library materials should be developed with specific reference to the Thai environment and in the Thai language.

6. Increase the number of Ph.D. graduates in applied animal science either by foreign training or producing doctoral programs in Thailand.

As long as Thailand depends on foreign training to produce Ph.D. graduates it will be burdened with high costs (about \$25,000-\$30,000 per person) and delays. Few of these Ph.D. students will be effectively trained in areas specifically related to Thai problems. Even though graduate education at the Master's level in applied agriculture is now developing in Thailand. Planning a Ph.D. program in applied agriculture should begin in the next few years.

7. The teaching program should be designed to develop a spirit of service to rural people, commitment to rural development and professional approaches to animal productivity.

RESEARCH PROGRAM IN AN ANIMAL TECHNOLOGY DEPARTMENT IN NORTHERN THAILAND

Present Status

It is widely recognized that agricultural research can be a powerful catalyst for agricultural development in Thailand. Agricultural research is defined as "the application of the scientific method to the systemic study of the physical, biological, and socioeconomic phenomena and process involved in the use of natural resources to meet human needs for food, shelter and personal development." Application of the scientific method involves:

- 1. A qualitative and quantitative description and characterization of the component parts of the food and fiber production system;
- The analysis of problems in an effort to increase the productivity and efficiency of that system;
- The development and testing of hypotheses concerning the various phenomena and processes of that system;
- The design and conduct of critical experiments to test those hypotheses;
- 5. The evaluation and interpretation of the results of such experiments; and
- The dissemination of the results and interpretations to other scientists, professional agriculturists, farmers and to the general public (Russell, 1974).

The major objectives of agricultural research system of the Institute of Agricultural Technology, Chiangmai are:

- To analyze agricultural problems as raised by farmers in order to render appropriate advice;
- To determine how new scientific developments in basic disciplines can be applied to conditions in northern Thailand;
- 3. To provide detailed information in suitable form to the extension service and thereby to farmers on the technical and economic aspects of various practices used in the production, marketing and utilization of agricultural commodities; and
- To maintain effective operational linkages with other research agencies in related fields both domestic and foreign.

The department of Animal Technology Chiangmai has been conducting an active research program since 1976. The first completed project was "using green sweet potato leaves to partially replace concentrate in swine rations." This started in October 1976 and ended in March 1977. The second project was a study of typical dairy production techniques of the farmers in northern Thailand which started in February 1977 and ended in February 1978. The last project was a comparison of poultry brooders techniques which started in March 1978 and ended in May 1978. Some of the major limitations facing the research program in animal technology in northern Thailand are as follows:

- 1. Lack of adequate research financial support.
- 2. Lack of well-trained scientists to do the research.
- 3. Lack of facilities and equipment.
- 4. Lack of deligation of decision making from university administration to the the Department level.
- 5. Lack of participation of the field staff in the planning and interpretation of experiments.
- Insufficient day-to-day supervision of research work by the research leaders.

Research Needs

- <u>The need for funds</u>: The organization of research within the university depends on funds and motivation. The lack of financial support was usually given as the reason for not doing more research.
- <u>The need for well-trained scientists</u>: The productivity and effectiveness of the research program will depend on the quality of its scientific staff.
- 3. <u>The need for research support services</u>: The research support services include physical facilities and equipment maintenance service, stenographic and typing service, a library, a statistical advisory and computating unit, a research farm superintendent, and a transportation unit. The failure to recognize the importance of these supporting services or the need to

staff them with adequately trained, reliable people will greatly reduce the productivity of the scientific staff of any research organization.

Proposed Research Program Improvement

1. More funds for research must be generated, and the obvious source is the university which has limited financial support from the government. The Department of Animal Technology Chiangmai can get some money from selling livestock each year, but it is not enough for research projects. University research teams should be allowed and encouraged to bid for research projects from the Ministry of Agriculture and Cooperatives and other government sources such as the Ministry of Interior and National Research council.

High priority of research both in terms of results and of its power for institutional improvement and building suggest that:

- a. Professors who do research should receive release time from teaching. This would be possible with the apparent surpluses of animal scientists expected for the next five years, especially as more Ph.D. graduates return from abroad.
- b. Provide availability of supplemental salary grants for those who are engaged in research.
- c. Successful researchers should be honored and respected by the administration and colleagues. Many researchers will be encouraged to pursue research despite its limited financial rewards.

2. Upgrade the professional qualifications of the research staff by the following:

- a. Provide more supervision and guidance by senior research workers. It would be the responsibility of the university to invite senior research workers from other universities or from the Ministry of Agriculture and Cooperatives, both in domestic or abroad to work with young scientists for six to ten months.
- b. A planned program of professional staff development. It should be enhanced professionally by staff seminars, special short courses and by participation of the staff at all levels in research program planning, conducting and evaluation. These programs should be held at each faculty of agriculture or Ministry of Agriculture.
- Provide for advancement based on merit and performance rather than seniority alone.
- d. Continue to broaden the base recruitment to include scientists from fields other than animal science. The other scientist fields include individuals with degrees in any of the physical, biological and socioeconomic disciplines.

3. Develop a set of research support services. High priority should be the physical facilities and equipment maintenance service, a statistical advisory and computating unit, and a research farm superintendent.

EXTENSION PROGRAM IN AN ANIMAL TECHNOLOGY DEPARTMENT IN NORTHERN THAILAND

Present Status

In the past decade there has been a significant awakening of interest in agricultural extension in northern Thailand. This has been made evident by an increased supply of money for extension, by more discussion within the professional of agriculture science, the growth of training facilities at some universities, and more public statements about extension programs from primary producers and their leaders. This increased interest has provided opportunities to develop new areas of extension services and to improve those already established. Interest has been sustained by the continuing growth of knowledge and the emergence of new technical services for rural industries.

Agricultural extension is defined as "a service or system which assists farm people, through educational procedures, in improving farming methods and techniques, increasing production efficiency and income, bettering their levels of living, and lifting the social and educational standards of rural life" (Williams, 1968). This definition is a general one relating to agricultural extension services, rather than an attempt to describe the situation as it exists in any one country. It also extends the scope of extension to a general educational purpose beyond agricultural techniques.

The definition of extension by FAO is phrased in terms suited to guiding the growth of extension systems in developing countries. Note that the extension program is addressed to farm families and relates to the farm home as well as the farm business. According to this definition, extension includes a more general educational purpose bearing on the outlook and receptive capacity of the farmer. It appears that extension is neither an agency administering rural programs on behalf of the government, nor is it an enforcement agency, but it is an informal out-of-school educational service for farmers and their families to adopt improved practices in crop and livestock production, management, conservation and marketing. Concern is not only with teaching and securing adoption of particular improved practices, but with changing the outlook of the farmer to the point where he will be receptive to, and on his own initiative, seek means of improving his farm business and home (Chang, 1962).

Extension programs have been regarded as one part of the activities of the Department of Animal Technology at Chiangmai. It will provide farmers with technical advice as a guide to improved farming methods and with economic information about their productivity and management problems, it will assist them in analyzing the alternatives available and making decisions about farm operations. In this sense, the extension activities overlap with and relate closely to the activities in research and teaching.

Advising farmers has been one of the responsibilities of the Department ever since it was established in 1974. To achieve this

task, the department staffs have rendered their services to farmers by farm visits, general meetings, demonstrations, broadcasting on T.V., radio programs, bulletins, leaflets, circular letters, and publishing of periodical and technical pamphlets. Moreover, training programs have been provided for farmers and people interested in agriculture by the Department or the Institute of Agricultural Technology and at the request of the government or private organizations. In the past two years several training courses in animal technology were provided by the Institute or the other organizations (Anon, 1978).

1. <u>Swine raising</u>: The Chiangmai Swine Production Cooperative requested the collaboration from the Department of Animal Technology and Office of Agricultural Research and Extension on holding a training course of Swine Raising between January 15-20, 1977 at the Institute of Agricultural Technology. Some professors from Kasetsart University, Chiangmai University, Khon Kaen University and Department of Livestock Development were also invited to teach the 60 trainees.

2. <u>Beef cattle raising</u>: This course was held at the Institute of Agricultural Technology with cooperation from Chiangmai Livestock Cooperatives, Frederick Ebert Foundation, and the Department of Animal Technology at Chiangmai. The objectives of this course were (1) to increase knowledge and experience in beef cattle production, (2) to develop the skill of problem-solving, and (3) to increase the sense of belonging to cooperatives. The farmers spent their time from March 30 to April 3, 1977 participating in this course.

3. <u>General Animal Husbandry</u>: This course was organized by the Accelerated Rural Development Board for training a group of their officers. It was held at their Training Center in Lampang Province from May 16 to June 15, 1977. Six professors from the Institute of Agricultural Technology participated in teaching and training 70 officers.

4. <u>Poultry raising</u>: At Ban Pang-Mu, Amphur-Muang, Mae-Hongsorn Province, the Accelerated Rural Development Board organized a training course on Poultry Raising for local farmers. The Institute of Agricultural Technology was requested to provide lectures for this training. Four professors joined the course as lecturers.

5. <u>General Agricultural Course for hill tribe leaders</u>: The Institute of Agricultural Technology, in cooperation with the YMCA at Chaingmai, organized a five-day training course on General Agriculture for hill tribe leaders. Forty hill tribes were selected to be trained in this course at the Institute in order to promote and encourage them to be specialists in agriculture. The training course started on January 16 and ended on January 20, 1978.

6. <u>General Agricultural Course for military officers</u>: The Army Authority in Chiangmai requested the assistance of the Institute of Agricultural Technology in providing the training course for 273 military officers. The course started on February 15 and ended on March 8, 1978. The trainees were divided into a group for animal technology and a group for plant technology.

The main objectives of the extension program of the Institute of Agricultural Technology are:

- To work in the best interest of the total agricultural development in northern Thailand.
- To extend results of agricultural research and new technology to farmers and people interested in agriculture.
- 3. To provide specific practical training programs for farmers, a short course of three to fourteen days duration.
- To extend adapted technology to the hill tribes in the Royal Hilltribes Development Projects.

Extension Needs

1. <u>The need for livestock extension specialists</u>: The extension specialist is the extension worker who provides leadership in his area of work, not by authority but by his knowledge of the field. He shares this knowledge as he anticipates the needs of the clients (Smith, 1930).

The Department of Animal Technology needs livestock extension specialists with some background in extension education and administration. These people should have advanced training (M.S. or Ph.D. degree) and be selected for their leadership and teaching ability.

2. <u>The need for training local farm people</u>: Extension experience throughout the world has unquestionably demonstrated the need for and benefits to be gained by training capable farm men, women and youth to serve as demonstrators of improved practices in agriculture. The acceptance of extension teaching is directly related to the degree of farmer participation in training, planning and implementing programs (Clark, 1974).

3. <u>The need for visual equipment</u>: The value of visuals in extension teaching has been known for centuries--even long before the ancient Chinese teacher observed that "one thousand hearings are not as good as one seeing."

This is significant for those who are engaged in the worldwide movement of improving agricultural efficiency through extension education. Visual teaching speeds learning, and brings about faster agricultural progress.

There are some human tendencies which are related to learning. A skillful extension worker knows and uses some of the natural, human tendencies. Man has a tendency:

- a. to seek and enjoy the presence of others;
- b. to seek and enjoy the approval of others and avoid criticism;
- c. to be aggressive or self-assertive. This explains how some individuals rise from a group to become leaders. Those less aggressive will follow good leadership;
- d. to be ruled by his emotions, such as liking and disliking others, joy, sorrow, fear, pride and envy; and
- e. to be visual-minded, that is, he is especially receptive to things seen as compared with things heard (Anon, 1959).

Village farmers are very likely to respond to teaching methods which are in accord with the above tendencies. They will tend to reject or resent methods which conflict with these tendencies. The visual equipment needs include cameras, movie cameras, movie projectors, overhead projectors, opaque projectors, slide projectors, slides, film strips, color films, and improved processing facilities.

Proposed Extension Program Improvement

1. To improve the present employed staffs toward careers in extension. They can be trained either locally or abroad. In any case, they must be carefully selected for their ability, aptitude, and interest in the work. Training would be associated with research in extension and in the disciplines on which it depends, and would provide opportunities for professional advancement by the award of higher degrees. The major portion of the curriculum for training extension staff should consist of technical animal courses, program planning, extension methods, leadership and rural development.

The significance of a widened scope of extension is analyzed in relation to training of personnel for wider responsibility. The following heading should be considered (Williams, 1968).

- a. Extension staff of the future will have more specialized personnel at every level.
- b. Regular training at the post-graduate level will be expected for virtually all extension workers.
- c. Training must be continuous.
- d. Some re-training will be needed to give certain extension workers new skills or knowledge to handle specific changes in their job.

e. One goal of every training program must be to get the individual extension worker to re-examine and re-define frequently his own job, the scope of his responsibilities, and his relationships with others.

It is also important that the livestock extension field worker should be from the same ethnic background as the people with whom he is to work, and speak the dialect of that area.

2. To increase the number of Ph.D. level staff by area in the Department of Animal Technology Chiangmai which were mentioned before.

3. The extension specialist should interact with the local people in the planning of an extension program as well as in its implementation. The local people, at least the local leaders, must be interested in their village situation and in the ways and means of improving it. As a result of discussions, only a small number of the most important needs will be included in the program. The program thus made will become a program of the people, and they will support it.

The selection of local leaders for extension purposes depends upon the local situations. If there are no local groups that the extension specialist can make use of, he has to move slowly and cautiously, to avoid friction and misunderstanding. The extension specialist should contact local leader and ask him to select a group of farmers who are well known in the village, and to meet them. In any case, the extension specialist can start informal discussion groups, consisting of ten to fifteen progressive farmers, living

in a small neighborhood. Such a group may meet regularly twice a month in a school, temple, or other central site. Each meeting should not last more than two hours, one hour for discussion on the most needed subjects such as animal nutrition, breeds and breeding, and sanitation, and one hour for recreation. In other words, the meeting should be made both productive and enjoyable.

4. The Department of Animal Technology and the Institute of Agricultural Technology Chiangmai should continue and greatly augment the present policy of training lay farm people to serve agriculture and improve their communities.

To get people to understand, accept, and put into practice is quite difficult. This is particularly true in extension teaching when the audience is always a heterogenous group of people who react differently. Normally before a new idea is accepted and put into practice, an individual must: be aware of it, become interested, decide whether or not the new idea is good, try it out, and finally adopt the new practice (Chang, 1962).

Since the extension audience is always a mixed group, its members will reach differently to the extension teaching. Many of them may be in the awareness stage for the first time, while a few may reach the interest or evaluation stage, and a very few others the trial stage. This points up the importance of effective extension teaching. There are now many methods to improve teaching. These are briefly discussed below (Chang, 1962).

- a. <u>Mass teaching methods</u>. These include radio, television, news stories, circular letters, and posters. Their usefulness is in making people aware of and interested in new ideas.
- b. <u>Group teaching methods</u>. These include general meetings, group discussions, result demonstrations, method demonstrations, exhibitions, tours and field trips. Such methods are useful in moving people from the awareness stage to the interest stage and sometimes to the trial stage of accepting the new idea put to them. When an idea is introduced to a small group, the participants may ask questions, exchange experiences, and stimulate each other to action.
- c. <u>Individual teaching methods</u>. This includes farm visits and in some cases office calls. The individual contact is most effective, because learning is an individual process. But it is the most expensive, because of the amount of time involved in making such contacts, and so it should be used very cautiously. Experienced extension workers are now inclined to use the group methods more and more, so that more people can be reached at a time.

Extension workers must be able to select the most appropriate method, or combination of methods, to put their message across. In general, people are influenced to make changes on their farms and in their communities, in proportion to the number of times suggestions

are put to them in extension teaching. Thus a continuous effort is required of the extension worker to be proficient in the use of a variety of teaching methods in order to achieve the desired objective.

5. To provide a wide variety of visual equipment to aid in extension. The visual equipment available allows the extension staff to select one or a combination of visuals that will fit a particular teaching problem or a particular audience. As stated before, the Department of Animal Technology have provided many training courses at the Institute of Agricultural Technology and at the others in northern Thailand. But visual equipment was not available. No single visual or visual method can be called the ultimate for extension teaching. Each has strengths and weaknesses. The important point is that an understanding of these strong and weak points will help the extension worker select the visuals to use in specific cases.

In using visual aids the extension staff members must establish their responses, objectives, outline the subject matter and visualize the important points.

There are several guides to help extension workers make a selection of visual equipment for teaching (Anon, 1959):

a. Consideration of the objective of teaching. Is the objective to change attitudes or to teach methods? If the extension worker is to teach methods, what is the specific skill he wishes to teach. If a given chart, model, demonstration or other activity can contribute significantly to the objective, he should use it.

- b. Consideration of the experience, education and background of the audience. For example, price fluctuations over a period of time can be shown by a line graph to a farmer who has had experience reading graphs. But to someone not having that experience, a graph would be inappropriate.
- c. Consideration of the cost of visuals, related to available funds. The chalkboard is inexpensive and easy to manipulate but requires more imagination. Exhibits can vary greatly in cost and their effectiveness can be just as variable. Usually the most expensive visual aid is a projector. But in the right place it is highly effective and well worth the price.
- d. Consideration of the availability of the desired visual aid. If the extension worker does not have a picture, he can find something to draw on. The more complicated visuals require equipment and often require power that may not be obtainable.

6. To arrange a demonstration of selected visuals at an annual conference or at regional meetings. This demonstration could be a part of a program arranged for other topics. It could take a day or less of the program time. After the demonstration take a poll of staff members to determine with which of the demonstrated visual aids they would like to have special training. This poll will indicate the visuals of most interest of staff members. It also will involve extension workers since they will have had some part in determining future training emphasis.

SUMMARY AND CONCLUSIONS

The Department of Animal Technology, faculty of Agricultural Production, Institute of Agricultural Technology, Chiangmai, Thailand, is organized into eight divisions: Dairy, Beef, Swine, Sheep and Goats, Poultry, Fisheries, Animal Nutrition, and Sanitation.

The number of staff members in the department in 1977 was nine: two D.V.M., two M.S., three B.S., and two certificates.

The two-year bachelor's degree program in the Animal Technology Department includes candidates for a B.S. degree in Animal Science with a major in Poultry Science, Dairy Science, Beef Science, Swine Science, Animal Nutrition, or Fisheries. During the first three years, students in only Poultry Science have been enrolled.

The common weaknesses in the teaching program in the Department of Animal Technology are the lack of experience in practical application, the lack of facilities and equipment, and the lack of animal scientists at the Ph.D. level.

Some proposals should have been made for improving the teaching program. Every opportunity to incorporate practical, action-related instruction should replace the lecture in applicable situations. A person with the practical experience should be utilized in the total teaching program. Coordination should be made by schools and the Institution as part of the curriculum plan. The basic equipment

and demonstration farm should be available to students. The number of Ph.D. scientists in animal science should be increased immediately.

The research program in the Department of Animal Technology appears to be minor in relation to other programs. There are still many immediate problems in the research program which need to be solved. The lack of well-trained scientists, the lack of adequate research financial support, and inadequate research support services all affect this program.

With appropriate financial resources, equipment and well-trained animal scientists, the Department of Animal Technology should be able to expand the research program and make a major contribution to livestock improvement programs.

As it presently exists in the Department, the extension program has three major deficiencies. The number of livestock extension specialists is inadequate and not sufficiently trained to be effective in dealing with farmers. The local farm people are not sufficiently aware of their local problems and of the ways and means of improving planning of the extension program and its implementation. The Department of Animal Technology does not have available visual equipment to aid in extension training programs that would be effective in the village.

The effectiveness of the livestock extension program needs to be strengthened to reach the goals set for livestock development and improvement for the farmers. Competent livestock specialists must be employed to develop an effective program in all phases of animal

production. It is also important to provide a wide variety of visual equipment to aid in the extension program.

The teaching, research and extension in animal technology are three of the essential programs that the Department of Animal Technology is providing the rural livestock development. Research evolves new ideas and new techniques, extension assists farm people to put into practice the products of research, and teaching provides trained personnel for all agricultural development, including research and extension. The three programs constitute the framework in which the department benefits the farm population. Whether such effort is utilized in the most effective and economic way depends on the organization and administration of these programs. This close association explains the efficiency of extension, the effectiveness of teaching and the usefulness of research in northern Thailand.

APPENDIX

APPENDIX

SPECIFIC COURSES FOR B.S. DEGREE IN POULTRY SCIENCE

		<u>Credit</u> <u>Hours</u>	<u>Hours/Week-</u> Lecture/Lab
1.	Basic requirements (not less than 10 credit hours)		
	English 5 English 6 Rural Sociology and Development Principles of Statistics Physical Education	2 2 3 3 0	2-0 2-0 2-2 3-0 0-2
2.	Related courses (not less than 24 credit hours)		
	Anatomy and Physiology of Farm Animals Applied Genetics General Microbiology Farm Utility Wood and Concrete Technology Agricultural Marketing Economic Growth in Agriculture Human Relation and Personnel Management	3 3 3 3 3 3 3 3 3	2-3 2-3 2-3 1-6 3-0 3-0 3-0
3.	Major courses (not less than 30 credit hours)		
	Poultry Farm Management Poultry Nutrition Incubation and Hatchery Management Poultry Breeding Poultry Products Technology Poultry Diseases and Sanitation Poultry Housing and Equipment Avian Physiology Selected Poultry Production Farm Practices	4 3 2 3 5 3 2 3 2 3 2	2-6 2-3 1-3 2-3 3-6 2-3 1-3 2-3 2-3 0-6
4.	Electives (not less than 6 credit hours)		
	Artificial Insemination Poultry Feed Crops Poultry Judging	3 3 2	2-3 2-3 1-3
5.	Special Problems	5	

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