"THE USE OF READY MIXED FEEDS FOR DAIRY CATTLE"

THESIS FOR DEGREE OF M. OF AGR.

JAMES RENFREW DICE.

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THESIS

The Use of Ready Mixed Feeds for Dairy Cattle.

A ready mixed feed is a feed that is made up of two or more different feed stuffs. They usually contain feed stuffs other than the so called standard feeds. Mixed feeds may be placed on the market as a balanced ration or with directions as to what should be mixed with them in order to make a good ration.

Originally the name mixed feed applied to the mill run or a mixture of all the byproducts from a flour mill and contained middlings and bran. While this mixed feed is found on the market today it has almost entirely been replaced by the ready mixed feeds containing other constituents.

The composition of the different mixed feeds varies. There are only two mixed feeds on the market that are generally recognised as mixtures of good standard feed stuffs, and even one of these varies somewhat at times in it's make up. As a rule mixed feeds contain some byproduct of little feeding value, and it is assumed that most of these mixtures are put on the market in order to get a good price for this byproduct.

The principal byproducts of questionable value which are used come from the manufacture of wheat flour and various kinds of breakfast foods; from breweries and distilleries; from the utilization of linseed and cottonseed waste; from the making of cane and

beet sugar; and from the manufacture of starch.

Most of our standard feeds come from these same sources. Some of the byproducts of little value are as follows : -

Wheat Screenings.

Before the wheat is ground for flour, it is put through a cleaning process. This removes all the small and shattered kernels, chaff, weed seeds and dirt. These are put on the market as wheat screenings.

This is one of the common constituents of mixed feeds. It contains a fair amount of digestable nutrients, but is objectionable because of the weed seeds and dirt. The weed seeds, if not ground or heated, will introduce obnoxious weeds. Seeds that are poisonous may also be present. Samples of wheat screenings have been analysed which contained from four to six percent of sand.

Buckwheat Hulls.

Buckwheat hulls are the hard fibrous covering of buckwheat. They are of no value as a concentrate feed.

Oat Byproducts.

Oat Clippings.

Oats are clipped to make them heavier. The operation consists of clipping the pointed end of the hulls. Usually the clippings contain the poorest part of the screenings. For this reason they contain large amounts of sand and silica. Samples containing four to six percent sand are not uncommon, and one sample collected in New Yory contained eight and six tenths percent sand and silica.

Oat Hulls.

The hulls constitute about 30 percent of the oat. In the making of breakfast food these hulls must be removed and thus there are immense quantities of hulls on the market. These are of no more value than oat straw, and are often mixed with other feed, especially with corn, to indicate that the feed containsoats.

Corn Cobs.

Ground corn cobs are valuable in a ration only to make it more bulky, thus it is poor policy to pay grain prices for a feed of the same feeding value as straw.The ground corn cobs mixed in feeds are very finely ground so add rather than detract from the appearance.

Rice Hulls.

Rice hulls are the outside covering of the rice kernel. They contain a large amount of silica and sand, are practically in - digestible and in some cases cause severe irritation of the digestive tract.

Flax Byproduct.

The only first class feed which derived from the flax plant is linseed meal or oil meal. Ground flaxseed is too expensive as the oil is so valuable. The other flax byproducts are put on the market as flax byproduct,flax feed and flax bran.There does not seem to be any definate classification. The value of these feeds depends on the amount of flaxseed they contain. They may contain inferior flaxseed, weed seed, fibre, stems and pods finely ground, and thus aside from the flaxseed they contain,they are worthless.

Cottonseed Hulls.

Cottonseed hulls are the hard,tough outer-covering of the cottonseed. They are used to advantage in the South as a roughage, but they have no place in a grain ration, on the market.

Cottonseed Linters.

Cottonseed linters are the small particles of fibre that the gin does not remove from the hull.

Dried Beet Pulp.

Dried beet pulp is a byproduct from the manufacture of beet sugar. As such it is a good standard feed. However,on account of its bulk and rather low feeding value,it is too expensive to use,either alone or in a mixed feed,unless a low shipping cost makes it profitable.

Molasses Feeds.

The principal constituents in most molasses feeds are the cane and beet molasses which are the final products from the manufacture of cane and beet sugar. Cane (blackstrap) molasses is a valuable feed, containing large amounts of carbohydrates in the form of sugar. Beet molasses is not so valuable,as it contains alkali and is bitter. The chief objections to the molasses feeds are,first,that all manner of absorbents are used in order to get the molasses on the market;and second,that the principal nutrients in the molasses feeds are carbo - hydrates,and they are the cheapest nutrients to buy. Thus the molasses feeds usually sell far above their value to the feeder.

Professor J.E.Halligan of the Louisiana Station states that the following materials are used in the manufacture of molasses feeds:-

"Cottonseed meal,malt sprouts,dried brewers grains, distillery byproducts, rice bran, rice polish, rice hulls, corn, corn chops, corn bran, ground corn cobs, ground corn stalks, corn pith, wheat products (generally wheat screenings), dried beet pulp,oats (generally off grade oats), oat hulls, finely ground or chopped hay, straw, flax by-products, elevator dust,grain smut and rust, all sorts of brushings, cleanings and sweepings, grain screenings, cockle seed, bran, ground peanut shells, weed seeds, chaff from pipe factories, and similar products." Salt is a very common ingredient. Of eleven dairy feeds analysed by Halligan only one contained no inferior material.

Molasses are being used so extensively that large quantities are being imported from Cuba and other counteries, and in one notable case a molasses feed is being imported from England.

The feed refered to is Molassine Meal. This is an honest feed in that it is plainly stated that sphagnum mossand peat are used as absorbents. Hills of the Vermont Station very clearly discusses it thus:-"First. The molasses content is not in excess of eighty per-cent, which is equivalent to 1600 pounds per ton. Second. Feed molasses is quoted in Vermont at seventeen cents per gallon, or at the rate of thirty-one dollars per ton. Sixteen hundred pounds would be worth approximately twenty-five dollars. Third. Molassine Meal was offered at thirty-nine dollars per ton. Fourth. Subtracting the molasses value ($25) from the local retail price asked for Molassine Meal ($39), leaves fourteen dollars which may be said to be the price paid for four or five hundred pounds of the moss or peat used as an absorbent

or at the rate of fifty-five to seventy dollars a ton." Hills further states that thousands of tons of sphagnum moss are available in this country, as is the molasses, so that it is hardly economical to freight molasses and moss across the Atlantic Ocean to sell at the price of our very best feeds.

The feeds which have been discussed are the more common ones used. If one hundred pounds of each of these feeds were mixed together, excepting the molasses feeds, the mixture would be of no more value than average farm roughage. Mixed feeds sometimes contain unusual ingredients, such as ground peanut shells, weed seeds, ground or whole, moss, and in some cases ground stalks of plants. Two years ago the writer's advice was asked, by a city man, as to whether it would be a safe investment to take stock in a company which was being organized to treat saw dust so as to make it available as an animal feed. This question was asked in all seriousness and because of his knowledge of Chemistry the man was firmly convinced that it was possible. Some unscrupulous dealers do not hesitate to work up anything to impose on the unsuspecting buyer.

The mixed feeds are used extensively in spite of the fact that nearly all of them contain one or more of these low grade feeds. There is abundent evidence of this. A representative of a feed dealers association stated recently that 750,000 tons of molasses feeds had been sold in this country during the last year. The agents of the Department of Agriculture of the State of New York collected samples

of one hundred and forty eight different kinds of ready mixed feeds during the year ending in 1913. The same report shows that there were less than twenty standard feeds on the market. Many of these, of course, were put out under different firm brands.

One reason for the extensive use of these feeds is that on account of the increased price of feeds the farmer is on the lookout for cheaper goods. According to data obtained by A.J.Nicholl of the New York Farmer's Institute staff, the price of feed has increased sixty nine percent in the last fifteen years. During this same period the prices paid for milk have only increased thirty nine percent.

Another reason is that on account of the farmers' ignorance of the feeding value of the nutrients in the feeds and of the animals requirements they do not understand nor use the information at their disposal, such as feed bulletins, issued by the Experiment Stations, or the analysis on the feed sacks.

The manufacturers of mixed feeds take advantage of these conditions. The farm papers and especially the dairy papers contain many advertisements for mixed feeds and only a few for the standard feeds appear. Thus the paper that gives to many farmers most of their instruction in regard to feeding brings to them many advertisements of mixed feeds, and by their thus forced silence really sanction them. Every means known in the art of advertising is used.

For an example take the method used by one firm. Their advertisement appears in one of the leading dairy papers of the country, proclaiming the virtues of the feed and describing a book entitled" A

Guide to Profitable Stock Feeding". When sending for the book the farmer is asked to send the name of the local feed dealer.

The preface to the book contains a high flown tribute to the ability and experience of the men who wrote the articles on feeding. It proclaims the firms faith in the balanced ration and makes it appear that the chief object in publishing the book is to give "assistance to all feeders of livestock who are desirous of obtaining increased profits". A picture of the "largest and best mill of its kind" is shown which "is kept running day and night to supply the constant demand" for the feed.

The first article is on"The Feeding of Dairy Cows". The author is one of the pioneer dairymen of our times, and all of his qualifications are given at the heading of the article. Few men know however that this once noted authority through dissipation has lost his last responsible position and is probably glad to write for such a firm for the same pecuniary reason that the dairy paper was willing to print their advertisement.

The article is well written and is orthodox in every respect, but concludes with five rations by the author, using the advertised feed, which he states are based on two Experiment Station bulletins. The firm adds four additional rations "which have been extensively used with good results". In calculating these rations the protein is given as eighty two percent digestible, which is not reasonable considering the constituents in the feed.

This article is followed by other standard articles on swine and on poultry by well known authorities. Into these articles the firm takes the liberty to insert, in parenthesis in heavy type, statements to the effect that their feed just meets the requirements given. One article on horse feeding is written by a well known member of the firm, and is written from the standpoint of using "_____ Horse Feed".

The different feeds mixed by the firm are then described and extolled. Two dairy feeds are in the list. The first and best of these "makes your feed bill smaller and your milk check larger". This feed is described as containing oats, wheat and barley, grain products, cottonseed meal, and molasses. Samples of this feed analysed in New York contained the following :- Grain screenings partly ground, clip - ped oat byproduct,cottonseed meal,salt and molasses. On the sack which is embellished with red to attract the eye the analysis is given as follows : -

Protein, not less than I5 percent.

Fat, " " " 4.5 " .

Carbohydrates, not less than 50 percent.

Fibre, not more than I2 percent.

The composition on the sack reads, "composed of cottonseed meal, mol - asses, ground", and the remainder whether intentional or not is illeg- ible. This is also true of the other brand of dairy feed. It is claim - ed that this "feed is usually sold at about the same price as ordinary

mill feeds and is far superior".

The directions for feeding show no signs of faith in a balanced ration. They are very inconsistent. One recomendation is that the feed "requires no mixing with any other feeds whatever". By comparison it is not reasonable to suppose that the protein in this feed is more than seventy percent digestible, and the carbohydrates and fat seventy-five percent. Using 20 pounds of mixed hay, 40 pounds of corn ensilage and IO pounds of this mixed feed per day, the nutritive ratio would be I:6.8. In recomending other feeds to mix with ____ Dairy Feed, feeds are advised which are either low or medium in protein and high in carbohydrates, probably because of their lower purchase price. One feed mixture they recommended has a nutritive ratio of I:7.7. These suggestions are made to "increase your profits", and "to make hundreds of dollars extra profit every year by feeding ____ Dairy Feed in combination with home grown grains as a substitute for bran or other wheat feeds, or by feeding an entire ready grain ration".

The testimonials from farmers of all kinds occupy eleven pages.

The firms offer to the feed dealer is that if he will send them the names of fifty of his patrons they will mail each patron a copy of their booklet, and send the dealer twenty-five additional copies.

The dealer whose name the writer sent in received the firms booklet with an invitation to send for prices. This invitation was refused because such a letter in all probability would be followed by

a traveling representative of the feed firm.

The mixed feeds do not meet the requirements for an ideal dairy ration.

The important things to consider in mixing a grain ration for dairy cattle are as follows : -

(a) Composition of the feed.

(b) Digestability of the feed.

(c) Bulkinessof the feed.

(d) Palatibility of the feed.

(e) Fertility derived from the feed.

(f) Economy of the ration.

The composition of ready mixed feeds varies greatly. As a rule they are not rich in nutrients especially in protein which is the most expensive nutrient to buy. In many cases their composition is such that it can be compared to some standard feed. Often a poor grade of mixed feed is compared to wheat bran. On the other hand some of the better grade of mixed feeds compare in composition favorably with some of our best feeds. In many of these feeds however there are large amounts of crude fibre.

The composition of any feed is not of as great importance as its digestability. The amount of the nutrients that is available to the animal is what is important. This is especially true of the protein. There are several forms of protein, some of them very digestible while others are practically indigestible. A chemists analysis may show a high protein content, when a feeding trial would show that a large percent was useless to the animal.From

definate tests the digestibility of all the standard feeds is known, while it is impossible for the Experiment Stations to determine the digestibility of the numberless mixed feeds on the market.

For an example, if equal parts of wheat bran and wheat middlings are mixed together they contain I7.3 percent protein. A ready mixed feed of equal parts of corn cobs, corn bran, wheat bran and cottonseedwould contain I8.6 percent protein. By not using a high grade of cottonseed this mixture could be sold much cheaper than the bran and middlings, and apparently the farmer would be getting a better feed. However 74 percent or I2.8 pounds per hundredweight of the proteim in bran and middlings is digestible, while only 55percent or I0.2 pounds per hundredweight of the mixed feed is digestible. One other thing to bear in mind is that a cer - tain amount of the digestible part must be used by the animal for digestion and assimilation. Thus only 33.7 percent of the total energy of wheat straw is available to an animal and it requires 27.7 percent of the total energy to digest and assimilate this, leaving only 6 percent of the energy available. In other words, wheat straw is practically useless for producing a product. The low grade fillers in the mixed feeds are just as useless. Sixty seven and one half percent of all the mixed feeds tested at the New York (Geneva) Station in I9I3 contained screenings, all of which contained sand, one sample analysing 4.2 percent sand. This is harmful as well as indigestible.

Practically all of the mixed feeds are palatable. This of course is necessary as it is useless to sell a feed that the cows will not eat. Where weed seeds which may be bitter are used other more palatable feeds cover this flavor. Salt is commonly incorporated for this purpose. Twenty seven percent of the mixed feeds sold in New York in 1913 were made palatable by the addition of molasses. Simply because a feed is palatable however does not prove that it is a good feed or an economical feed. A child may eat a pound of chocolates with great relish but it is not good for the child nor an economical diet.

A dairy ration should be bulky. The mixed feeds certainly are, on account of the bulky fillers used, so that in this respect they meet the requirements.

The fertility contained in a feed is an important item to concider when purchasing. About seventy five percent of the protein passes through an animal and is available in the manure. Thus the richer a feed is in nutrients the more fertilizing constituents will be contained in the excrement. Denmark, England and other foreign countries have taken advantage of this fact and import annually thousands of tons of high protein feeds, and have by so doing built up the fertility of the soil. A large majority of the mixed feeds are not high in nutrients and thus are not so valuable as fertilizers. Many feeds still contain weed seeds which will introduce weeds on the farm where they are used.

That the ration should be economical is after all one of

the most important factors. Many feeds may be used and several methods of feeding employed and meet the requirements discussed above, but to get the most economical results from feeding requires the constant attention of the farmer. The best practice requires that the carbohydrates, bulky feeds and roughages should be raised on the farm. In case this is impossible it is usually cheaper to buy the bulky feeds and the carbohydrates by themselves, because of their comparatively low selling price. The reason for this is evident when we consider shipping charges, as it costs more to sack, ship and handle a bulky feed than a concentrated one.

The average ready mixed feed is bulky, and it is always sacked. The ingredients are as a rule not only shipped long distances, but are rehandled once or several times getting them together and mixing them. To this must be added the excessive cost of advertising, and in very many cases the maintenance of traveling salesmen, who not only see the dealer, but go to the farm to persuade the farmer. Considering the ingredients in a mixed feed, the cost of mixing and selling it, it is hardly reasonable to believe that it could be economical.

The following experiment was conducted to determine the ability of the average feeder to select a good feed, when the feed is judged by appearances.

The men used were a class of thirty three students just beginning a study of feeds and feeding. All of these men had either been raised or worked on dairy farms where they had become acquaint -

ed with dairy feeds. From the fact that they were progressive enough to go to an Agricultural School it would be reasonable to suppose that their judgement of feeds would be as good as the average farmer.

These men were asked to examine thirty unnamed feeds and using the total feed nutrientsthey contained as the standard,state whether they were good, medium or poor.

The following feeds and feed mixtures were used : -

I. Ground corn cob.

2. Acme Feed, containing hominy feed and oat hulls.

3. Hominy feed.

4. Equal parts of wheat bran and white wheat middlings.

5. Chesbro's Stock Feed, containing corn, barley, cottonseed meal, red dog flour, oat shorts, oat middlings, oat hulls, and one half percent salt.

6. Malt sprouts.

7. Quaker Molasses Feed, containing cottonseed meal, malt sprouts, screenings, weed seeds, flax byproduct, oat middlings,oat shorts, oat hulls and molasses.

8. Wheat bran, corn bran, ground corn cobs, equal parts.

9. Mixture of one part of hominy feed, one partof linseed meal, two parts of wheat bran, two parts of ground oats.

IO. Unicorn Dairy Ration,containing distillers grains, cottonseed meal, hominy meal, gluten feed, brewers grains, barley feed, malt sprouts, and wheat bran.

II. Union Grains, containing distillers grains, cottonseed meal,

linseed meal, wheat middlings, wheat bran, hominy meal, barley, malt sprouts and salt.

I2. Corn bran.

I3. Brewers grains.

I4. Gluten feed.

I5. Distillers grains.

I6. Mixture of one part of hominy feed, one part of gluten feed, one part of cottonseed meal, and two parts of distillers grains.

I7. Flax Byproduct.

I8. Rice bran.

I9. Rice polish.

20. Mixture of two parts of wheat bran, two parts of hominy feed, two and one half parts of gluten feed, one part of cottonseed meal,and three parts of distillers grains.

2I. Mixture of equal parts of gluten feed and brewers grains.

22. Mixture of equal parts hominy feed,gluten feed, cottonseed meal and brewers grains.

23. Mixture of two parts of wheat bran, two partsof ground oats, one part of hominy feed and one part of linseed meal.

24. Mixture of two parts of hominy feed, one part of corn cobs, and one part of alfalfa meal.

25. Mixture of two parts of wheat bran, one part of ground oats, one part of hominy feed, one part of distillers grains and one part of linseed meal.

26. Mixture of equal parts of brewers grains and distillers grains.

27. Mixture of equal parts of corn cobs and rice polish.

28. Mixture of equal parts of corn cobs and gluten feed.

29. Mixture of equal parts of Number 23 and distillers grains.

30. Mixture of equal parts of corn cobs, corn bran and gluten feed.

These feeds were placed in pans and the students were allowed to examine them as they would at the feed store.

The feeds were placed by the students as follows : -

	Good.	Medium.	Poor.
No.I.	0	IO	23
No.2.	I4	I4	5
No.3.	I6	I5	2
No.4.	I2	I9	2
No.5.	28	4	I
No.6.	I	7	25
No.7.	4	20	9
No.8.	7	9	I7
No.9.	5	20	8
No.IO.	5	I2	I6
No.II.	8	20	5
No.I2.	I	IO	22
No.I3.	2	5	26
No.I4.	29	4	0

	Good.	Medium.	Poor.
No.I5.	4	I4	I5
No.I6.	I5	I5	3
No.I7.	I	5	27
No.I8.	I8	I4	I
No.I9.	29	2	2
No.20.	8	22	3
No.2I.	I4	I8	I
No.22.	2I	9	3
No.23.	5	2I	7
No.24.	5	I5	I3
No.25.	2	II	20
No.26.	I	7	25
No.27.	27	5	I
No.28.	22	II	0
No.29.	7	I7	9
No.30.	I4	I6	3

Twelve of the class or thirty six percent had as many as ten of these feeds properly classified. Asa striking example of the showing a ready mixed feed containing some useless bypro - ducts makes against a mixture of standard feeds, or a good ready mixed feed notice the placings of Numbers 4,IO and 5. Only thirty six percent of the class considered a mixture of wheat bran and white middlings a good feed, and only half of the class called

Unicorn Dairy Ration good, and it is probably the best ready mixed feed on the market. At the same time eighty four percent of the class called Chesbro's Stock Feed good, and it contains oat hulls and salt along with other byproducts of questionable value, covered with red dog flour and corn.

After these feeds were discussed the class was given a sample of mixture No. 23, consisting of two parts of wheat bran, two parts of hominy feed, two and one half parts of gluten feed, one part of cottonseed meal, and three parts of distillers grains, and also a sample of the same grain mixture containing ten percent of ground corn cobs. They were then asked which feed they considered contained the most feed nutrients. Forty eight percent chose the feed adulterated with corn cobs to fifty one percent who chose the unadulterated feed.

An expert with full knowledge of feeds and methods of identifying them by the use of the microscope is able to estimate approximately the food value of a feed or feed mixtures.

These experiments would seem to indicate that the average man could not estimate the nutrient value of a feed by using the means at his disposal at the feed mill. It will be noticed however that it is easier to detect the poor and good feed materials such as ground corn cobs, flax byproduct, hominy feed and gluten feed, but that they are hard to detect when in feed mixtures. Thus the opportunity for the feed manufacturer to mix up rations

of doubtful value.

The farmer should be educated to buy standard feeds and to mix them rather than to buy ready mixed feeds, or at least to use the best grades of mixed feeds as a base and add standard feeds to it to give the proper ration.

The ignorance of the average farmer as to the feed requirements of the dairy cow is almost unbelievable. There was a day when ground corn and wheat bran with the common farm roughage was the usual ration for a cow. With the coming in of winter dairying, which is of comparatively recent origin, a different ration was necessary. At that time the farm papers and the Farmer's Institute lecturers began to advise the use of more protein and that advise has been kept up until the dairyman, outside the corn belt at least, have come to believe that protein is the only nutrient required for milk production. This is the reason why a feed which contains a little more crude protein than wheat bran makes such an appeal to the farmer.

The firms putting the mixed feeds on the market also make use of the fact that the farmer usually does not understand the difference between the total nutrients in a feed and the digestible nutrients.

A very common trick of manufacturers is to use the results of an Experiment Station's work, which applies to one particular condition, to apply to the whole field of feeding.

Just how this information is to be brought to the

attention of the farmer is a problem.

The farm press is silent as it must depend on it's advertising to exist and the feed dealers are good advertisers.

The Farmer's Institute worker and the Agriculturist of the Farm Bureau come in contact with only a small percent of the feeders, while practically all of the farmers come in contact with the local feed dealer and many of them are visited by the representatives of some of the brands of feed.

The Experiment Stations by experiment proved that the condimental or stock foods were useless in feeding farm animals but no Station has, to the writers knowledge, experimented with the ready mixed feeds. One reason for this probably is that trained men know that the majority of these feeds do not contain the nutrients they should and are undesirable on account of the fillers they contain.

The disadvantages of using ready mixed feeds may be summerized as follows: -

First: - With a few exceptions they contain bypro - ducts of little feeding value which are mixed with standard feed stuffs in order to sell them. Many feeds contain weed seeds, sand and other harmful materials.

Second: - The Experiment Stations have determined the digestibility of only a few of the best known mixed feeds, thus the dairyman does not know the digestibility of the mixed feed he is using as his ration or part of his ration.

Third: - Without an exception the feed costs more in the ready mixed form than it would to buy the standard feeds separately and mix them. The difference in price varies from one dollar per ton, a fair charge for mixing, to prices which are unreasonable. This high cost is due to shipping bulky feeds long distances, the expense of rehandling, mixing, and advertising the feeds, and in some cases an extra toll is collected because of misrepresentation of the feeds or the ignorance of the dairyman.

Thus it is evident that the purchase of standard feeds is better practice, because their composition and digestibility are known and as a rule they are free from adulterations.

The End.

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