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A. E. Ext. 524

PURCHASING HIGH MOISTURE CORN

Darwin P. Snyder

Department of Agricultural Economics
New York State College of Agriculture
A Statutory College of the State University
Cornell University, Ithaca, New York

Research on the subject of high moisture corn has been published by the Department of Agricultural Economics as A.E. Res. 263, "Economic Considerations of High Moisture Corn for Dairymen". That publication contains an Appendix which includes tables and calculations related to the subject.

Information in the research bulletin with some modification has been divided into three topics to satisfy separate areas of interest. These topics are discussed in the following extension publications:

A.E. Ext. 522 Should a Dairymen Grow High Moisture Corn?

A.E. Ext. 523 Alternatives for Using High Moisture Corn by
Dairymen

A.E. Ext. 524 Purchasing High Moisture Corn

PURCHASING HIGH MOISTURE CORN

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PURCHASING HIGH MOISTURE CORN

INTRODUCTION

One of the more recent developments in the use of high moisture corn (HMC) has been its purchase by dairymen. While it is generally true that silages and HMC grown by a dairyman can best be fed where they are grown, the sale of HMC from storage may be profitable for crop farmers. At the same time the purchase may be profitable for the dairyman.

Some dairymen may wish to use HMC even though they do not have enough land to grow grain or do not get corn yields which are high enough to be consistently profitable. Others purchase HMC during the year to supplement that which they do grow. This can enable them to feed the material year round thereby reducing their storing and feeding costs per ton. In any case, the basic reason for purchasing HMC should be to reduce the cost of concentrate nutrients fed to the herd and so increase net income.

Either high moisture shelled corn (HMSC) or high moisture ear corn (HMEC) can be purchased at harvest time. HMSC can also be purchased during the rest of the year from crop farmers who store it at harvest time on their farm in sealed storage for later sale to dairymen. Generally, when HMC is sold in quantity it is in the form of shelled corn and is stored in sealed storage by the dairyman. The material is processed through a roller mill as it comes from the silo for feeding. Purchased HMC, in either form, has also been stored in concrete silos with satisfactory results under good management. With concrete storage, HMSC, as well as HMEC, is usually ground as it goes into the silo.

The corn grower who sells HMC at harvest time does not have to invest in storage facilities, nor does he have any drying costs. However, he must have well organized transportation arrangements to move the corn as it is harvested or the harvest operation will be delayed. To eliminate this possibility some producers have built storage facilities, usually sealed units, and have depended on normal price increases to more than cover storing and handling costs. Marketing arrangements can then be made after harvest. The corn handled this way is HMSC and is usually sold to dairymen who harvest and store some HMC on their farm but not enough to feed their herd year round.

Before buying corn a dairyman should consider the several alternatives open to him. First, dry shelled corn can be purchased quite readily. It is usually available through a feed dealer at retail or it might be obtained directly from a producer at wholesale. Second, dry ear corn is available in some areas. Third, every dairyman has the alternative of buying nutrients in the form of commercial dairy rations. Finally, he may buy high moisture corn in several forms. In making this evaluation the dairyman should consider the costs and feeding values of each alternative available to him.

PRICING HMC

When negotiating price for HMC the dairyman must realize that the price he pays at the seller's farm is only one of several costs he will experience before the material is fed. However, the price paid per ton of corn is the major cost. Also, since it is related to dry shelled corn prices, the HMC price will likely vary during the feeding season unless a contractual arrangement is made with the seller.

Since dry shelled corn is fairly readily available, the current price paid to producers by commercial buyers for corn in that form can provide an easily determined starting point for negotiations. Then adjustments should be made for the cob and/or moisture content of the HMC.

The equivalent value of shelled corn at various moisture levels and prices can be determined by using Table 1. Also, when the price of dry shelled corn is known, the table can be used to determine the value of ear corn at any moisture level. The price paid for HMSC or HMEC should not exceed its value when related to the price at which the dairyman could purchase dry shelled corn. If it does, the dairyman is paying more than the corn is worth.

Table 1.

EQUIVALENT VALUE OF SHELLED CORN AND EAR CORN AT
VARICUS MOISTURE CONTENTS

Price Per Ton Paid to the Producer

Mois- ture	Shelled corn	Ear corn	Shelled corn	Ear corn	Shelled corn	Ear corn	Shelled corn	Ear corn	Shelled corn	Ear corn
%	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
12	39.34	35.41	41.41	37.27	43.48	39.13	45.55	41.00	47.62	42.86
14	38.45	34.61	40.47	36.42	42.49	38.24	44.52	40.07	46.54	41.89
15	38.00	34.20	40.00	36.00	42.00	37.80	44.00	39.60	46.00	41.40
16	37.55	33.80	39.53	35.58	41.51	37.36	43.48	39.13	45.46	40.91
18	36.66	32.99	38.59	34.73	40.52	36.47	42.45	38.21	44.38	39.94
20	35.76	32.18	37.65	33.89	39.53	35.58	41.41	37.27	43.29	38.96
22	34.87	31.38	36.71	33.04	38.54	34.69	40.38	36.34	42.21	37.99
24	33.98	30.58	35.76	32.18	37.55	33.80	39.34	35.41	41.13	37.02
26	33.08	29.77	34.82	31.34	36.56	32.90	38.31	34.48	40.05	36.05
28	32.19	28.97	33.88	30.49	35.58	32.02	37.27	33.54	38.96	35.06
30	31.29	28.16	32.94	29.65	34.59	31.13	36.23	32.61	37.88	34.09
32	30.40	27.36	32.00	28.80	33.60	30.24	35.20	31.68	36.80	33.12
34	29.51	26.56	31.06	27.95	32.61	29.35	34.16	30.74	35.72	32.15
36	28.61	25.75	30.12	27.11	31.62	28.46	33.13	29.82	34.64	31.18
38	27.72	24.95	29.18	26.26	30.64	27.58	32.09	28.88	33.55	30.20
40	26.82	24.14	28.23	25.41	29.65	26.69	31.06	27.95	32.47	29.22
Mois- ture	Shelled corn	Ear corn	Shelled corn	Ear corn	Shelled corn	Ear corn	Shelled corn	Ear corn	Shelled corn	Ear corn
%	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
12	49.69	44.72	51.77	46.59	53.83	48.45	55.91	50.32	57.97	52.17
14	48.56	43.70	50.59	45.53	52.61	47.35	54.64	49.18	56.66	50.99
15	48.00	43.20	50.00	45.00	52.00	46.80	54.00	48.60	56.00	50.40
16	47.43	42.69	49.41	44.47	51.39	46.25	53.37	48.03	55.34	49.81
18	46.31	41.68	48.24	43.42	50.16	45.14	52.09	46.88	54.02	48.62
20	45.18	40.66	47.06	42.35	48.94	44.05	50.82	45.74	52.71	47.44
22	44.05	39.65	45.88	41.29	47.72	42.95	49.55	44.60	51.39	46.25
24	42.92	38.63	44.71	40.24	46.49	41.84	48.28	43.45	50.07	45.06
26	41.79	37.61	43.53	39.18	45.27	40.74	47.01	42.31	48.76	43.88
28	40.66	36.59	42.35	38.12	44.05	39.65	45.74	41.17	47.43	42.60
30	39.53	35.58	41.18	37.06	42.82	38.54	44.47	40.02	46.12	41.51
32	38.40	34.56	40.00	36.00	41.60	37.44	43.20	38.88	44.80	40.32
34	37.27	33.54	38.82	34.94	40.38	36.34	41.93	37.74	43.48	39.13
36	36.14	32.53	37.65	33.89	39.15	35.24	40.66	36.59	42.16	37.94
38	35.01	31.51	36.47	32.82	37.93	34.14	39.39	35.45	40.85	36.77
40	33.88	30.49	35.29	31.76	36.71	33.04	38.12	34.31	39.53	35.58

Note: The price per pound of dry matter is the same throughout each column. The price per pound of feed value is the same throughout each pair of columns.

Use: When 15% moisture shelled corn costs \$40 per ton, 28% moisture shelled corn is worth \$33.88 per ton and 33% moisture ear corn is worth \$28.38 per ton (interpolated).

COST OF HANDLING PURCHASED HMC

Before agreeing to a price for buying HMC the dairyman should estimate what it will cost him to handle it to the time when it is ready-to-feed. It is important that the farmer estimate the cost for each source of energy in its ready-to-feed form on the farm and compare the feed value for each at that point. Otherwise, all of the costs for each energy source may not be included and the comparison of alternatives will not be valid.

The cost of handling HMC should include a figure for each of the items listed in Table 2. In the event the seller delivers the HMC for a set price, the agreed upon price will include the cost of trucking. To be consistent the trucking cost should be separated from the price of the HMC and included with other handling costs. The other costs should cover filling the dairyman's silo, storage and interest costs, and the costs of operating the silo unloader and roller mill, if needed. These costs will not vary significantly from those estimated in Table 2. However, because of various distances, trucking costs per ton may change accordingly.

Table 2. COMPARISON OF COSTS FOR DIFFERENT
METHODS OF HANDLING
PURCHASED HIGH MOISTURE CORN¹

Item	Cost Per Ton			
	Sealed silos		Concrete silos ²	
	HMSC	HMEC	HMSC	HMEC
Trucking	\$4.00	\$4.00	\$4.00	\$4.00
Filling silo	0.25	0.25	0.25	0.25
Grinding	----	0.75	0.75	0.75
Cost into storage	\$4.25	\$5.00	\$5.00	\$5.00
Storage	\$3.61	\$3.77	\$2.34	\$2.25
Interest	1.19	1.04	1.22	1.04
Storing costs	\$4.80	\$4.81	\$3.56	\$3.29
Unloader	\$1.17	\$1.89	\$1.64	\$1.40
Roller mill	0.78	----	----	----
Removal costs	\$1.95	\$1.89	\$1.64	\$1.40
Total handling costs	\$11.00	\$11.70	\$10.20	\$9.69

Source: Estimates based on New York Farm Cost Account records and data obtained from dairy farmer interviews.

¹ For 180 tons of 28 percent moisture shelled corn and 212 tons of 33 percent moisture ear corn which provide equal quantities of TDN. One filling only.

² Assumes a 5 percent storage loss which affects storage and unloader costs.

FEED VALUE OF HMC

The dairyman needs to know the value of the feed he is purchasing. HMC is a high energy concentrate with a relatively low protein content. The content of energy and protein will vary with the moisture and cob content of the feed. The feed value of HMC will depend some on the price of the most common high protein feed but mainly on the price of the most common high energy feed.

The Petersen method of valuing feeds is designed to relate these factors and can be used to determine relative feed values of various feeds including HMC. This method uses No. 2 shelled corn as the base high energy feed and soybean oil meal as the base high protein feed. The feed value of HMC will change significantly as the price of shelled corn changes and only slightly as the price of soybean oil meal changes. Therefore, the price of dry shelled corn is the most important factor in determining the feed value of a given quantity of high moisture corn. As the price of dry shelled corn, ground and delivered to the dairyman, increases the feed values of HMEC and HMSC also increase.

Feeding values of HMSC and HMEC are presented graphically in Figure 1 for various costs of dry shelled corn. These values, using the Petersen method, take into account the value of the protein in the HMC as well as the energy. Since the HMC is valued at the time of feeding, the costs per ton of dry shelled corn include costs of delivery and grinding. Figure 1 will provide a reasonably accurate estimate for the feed value of HMC. If the moisture content is appreciably different, the value can be adjusted by making use of Table 1.

In using Figure 1 the total cost of the HMC should be determined, as in Table 3, and then compared to the feed value purchased when shelled corn costs vary. For example, when dry shelled corn costs \$60 per ton ready to feed Figure 1 indicates that 28% shelled corn has a feed value of a little over \$51 per ton. Comparing that value with the cost of \$46.58 per ton of 28% shelled corn (Table 3) shows the purchase of HMSC to be profitable. However, if dry shelled corn costs \$50 per ton ready to feed, HMSC costing \$46.58 per ton would not be a good buy since its feed value relative to dry shelled corn is only \$42.50 per ton.

This comparison is a good one to make but not as important as the comparison of total nutrient costs for each alternative ration which follows.

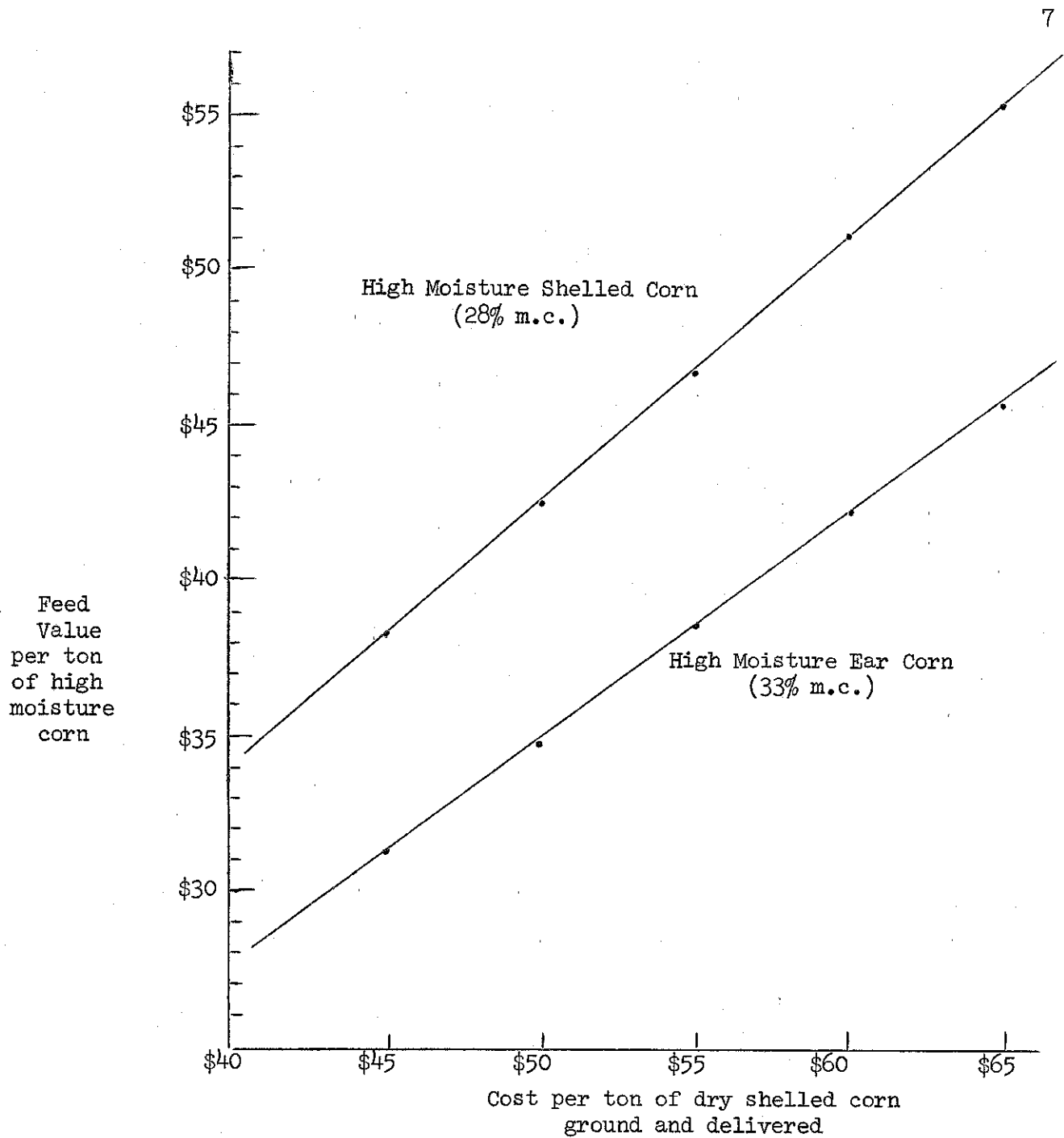


Figure 1.

FEEDING VALUES OF HIGH MOISTURE CORN RELATED
TO COST OF SHELLED CORN

PURCHASE OF HIGH MOISTURE CORN
AT HARVEST TIME

Comparison of Alternatives

An example will be used to illustrate how a dairyman might proceed to compare alternative ways of providing concentrates for his herd.

Mr. Jones, a dairyman, has no facilities for storing a large quantity of corn on his farm. He wishes to provide adequate concentrates for his herd as cheaply as possible. After gathering some information he finds he has the following alternatives:

1. Mr. Jones can purchase a commercial dairy ration at an average price of \$75 per ton throughout the year.
2. He can buy dry shelled corn during the year for an average of \$55 per ton at the mill. It costs \$5 per ton to deliver, grind and mix the grist making the total cost \$60 per ton.
3. Mr. Jones can purchase corn at harvest time from a producer and handle it in any of several ways. His cost is based on \$42 per ton of dry shelled corn, the price the producer would get from a feed dealer.

Cost at the time of feeding would be:

- (a) Dry shelled corn stored at the feed dealer's mill -

\$42	corn
2	dealer handling charge
1	interest
5	delivery and grinding
<u>\$50</u>	per ton

- (b) High Moisture Corn - total costs for various ways of handling HMC are estimated in Table 3. These costs include provision for farm storage.

High protein supplements must be provided with purchased corn and cost \$83 per ton for a 40% supplement with urea and \$90 per ton for a 33% supplement without urea that can be fed straight.

Table 3. COMPARISON OF TOTAL COSTS FOR DIFFERENT
WAYS OF HANDLING
PURCHASED HIGH MOISTURE CORN

Item	Cost Per Ton			
	Sealed silos		Concrete silos	
	HMSC	HMEC	HMSC	HMEC
Purchased at harvest:				
Cost of HMC ¹	\$35.58	\$29.80	\$35.58	\$29.80
Handling costs ²	11.00	11.70	10.20	9.69
Total cost	\$46.58	\$41.50	\$45.78	\$39.49

¹ Purchased from the producer based on a price of \$42 per ton for dry shelled corn; 28% moisture shelled corn, 33% moisture ear corn; See Table 1.

² See Table 2 for detail.

Mr. Jones estimated that the average moisture content of shelled corn at the time of harvest would likely be about 28 percent. Also, he realized that if the same crop were harvested as ear corn the higher moisture content of the cob would raise the moisture content of the whole ear to about 33 percent. Mr. Jones was willing to pay a price for HMC equal to or less than its value as dry shelled corn. Assuming a price of \$42 per ton for dry shelled corn and using Table 1, he determined his top price for HMC at his assumed moisture levels and added that to his estimated handling costs to get a cost per ton of HMC ready to feed (Table 3).

Except for the commercial ration, each alternative must be supplemented to provide the herd with a properly balanced concentrate ration. These energy sources may require different amounts of various supplements to provide the same amounts of nutrients. Therefore, a comparison is made in Table 4 of the total nutrient cost for rations of equal nutrient value. Each ration contains one alternative energy source available to Mr. Jones, plus the amount of a supplement necessary to provide the same TDN and total protein contained in one ton of commercial ration.

Table 4. COMPARISON OF NUTRIENT COSTS FROM PURCHASED CONCENTRATE RATIONS OF EQUAL NUTRIENT VALUE

Ration	Cost per ton ready to feed	Pounds of feed	Ingredient cost	Nutrient cost ¹
Purchased during the year from dealer:				
1. Commercial ration	\$75.00	2000	\$75.00	\$75.00
2. Dry SC, retail	60.00	1500	45.00	
40% supplement	83.00	500	20.75	65.75
Purchased at harvest time from producer:				
1. Dry SC	\$50.00	1500	\$37.50	
40% supplement	83.00	500	20.75	\$58.25
2. High Moisture Corn				
(a) HMSC (sealed silo)	46.58	1500	34.94	
33% supplement	90.00	630	28.35	63.29
(b) HMEC (sealed silo)	41.50	1762	36.56	
33% supplement	90.00	650	29.25	65.81
(c) HMSC (concrete silo)	45.78	1500	34.34	
33% supplement	90.00	630	28.35	62.69
(d) HMEC (concrete silo)	39.49	1762	34.79	
33% supplement	90.00	650	29.25	64.04

¹ Plus the cost of additional salt and minerals if needed.

Note - nutrient values:

	TP	TDN
Commercial ration -	16%	73%
Supplement -	40	60
	33	73
Corn: 15% SC (dry) -	8.7	80.1
28% SC	7.4	68.2
33% EC	5.9	58.0

From this comparison Mr. Jones would decide that his best alternative would be to purchase dry shelled corn from the producer at harvest time and have his feed dealer store the corn for use in grist prepared and delivered periodically throughout the year.

Dairymen, in applying this procedure to their situation, should determine their own alternatives, make realistic assumptions and substitute their figures for Mr. Jones' in the preceding example. The basic research bulletin, A.E. Res. 263, "Economic Considerations of High Moisture Corn for Dairymen", provides tables which will be helpful in making estimates relative to the use of HMC.

PURCHASE OF HMC DURING THE YEAR

Some dairymen produce HMC but have limited storage capacity and, therefore, can not store enough to feed their herd year round. For these farmers the purchase of HMC may be advantageous.

If there are crop farmers in the area who make it a practice to store shelled corn in sealed silos at harvest time for later sale to dairymen these can provide an additional source of HMC. To make the most of this opportunity the dairyman must assure himself of a definite source and fair price. He should anticipate his needs and make arrangements in advance for delivery and price. The price can be related to the market price at the time of delivery by using an aid such as Table 1.

The cost of the high moisture shelled corn purchased to supplement a dairyman's own crop will include charges for the same items as shown in Table 2. However, total handling costs will be less. Because more than one silo filling is involved, the larger volume will reduce the storage, unloader and roller mill costs. Interest will also be lower because of the shorter storage time. Since corn prices normally rise after harvest, higher costs for the high moisture corn at the seller's farm should be expected. Under normal conditions the total cost of the HMSC will be about \$2 per ton higher than if purchased at harvest time - if Table 1 is used to determine the price of the corn (Table 5).

Table 5. TOTAL COST OF HIGH MOISTURE SHELLLED CORN
PURCHASED DURING THE YEAR

Item	Cost Per Ton	
	Sealed silo	Concrete silo ²
Purchased in the spring:		
Cost of the HMSC ¹	\$40.66	\$40.66
Handling costs	7.63	7.60
Total costs	\$48.29	\$48.26

¹ Purchased from the producer when he could get \$48 per ton for dry shelled corn at his farm.

² Storage loss of 5 percent is assumed.

If these costs are used in the comparison in Table 4, the purchase of high moisture corn would be more profitable than changing to a commercial ration but not necessarily the most profitable alternative.

SUMMARY AND CONCLUSIONS

1. The price per ton a dairyman pays for purchased HMC should be dependent on the following factors:
 - (a) Moisture and cob content
 - (b) Current dry shelled corn prices
 - (c) Nutrient cost for alternative rations
2. When equal feed value is purchased HMSC is more profitable than HMEC regardless of type of storage.
3. The cost per ton of HMC should include trucking, handling, storage, etc. in addition to the price paid to the producer for the corn itself.
4. Purchased HMC can be profitable for dairymen but the margin is likely to be significantly lower than for HMC grown by dairymen with good yields.
5. Other alternatives for providing concentrate nutrients to the herd may be more profitable than purchased HMC.

Before buying high moisture corn the dairyman would be wise to try to estimate his handling cost per ton as in Table 2. Then this figure should be used along with the cost of HMC and other ingredients to estimate the cost of nutrients, as in Tables 3 and 4. Comparing this with the cost of nutrients from other sources should provide him with a sound basis for making a decision.