Relative Value of Grains for Market Hogs

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Cereal grains are the primary energy source in swine rations. In the corn belt states, corn is the grain. However, in Oklahoma and other southwestern states, sorghum grain (milo) has been the principal grain fed to swine with wheat or corn replacing milo when price fluctuations justify the change. This Fact Sheet discusses the relative value of these grains and contains a nomograph whereby one may easily determine which grain should be the best buy.

Different Grain Sources

Corn is the preferred cereal grain (energy source) by most pork producers. However, other cereal grains are often a better buy. During the past few years, there have been periods where the most economical grain to feed swine has changed on a month to month basis.

Milo, as shown in Table 1, has an average nutrient content similar to corn. However, a review of available literature indicates a wide range of nutritive content between different samples of milo. Milo may vary from 7 to 12% crude protein. Usually pigs gain slightly slower and less efficiently on milo than corn. Research in Oklahoma and other states shows that milo has approximately 95 percent the energy value, and 92% the lysine value of corn.

Wheat as shown in Table 1 is very similar in energy content to corn and milo. It is usually superior in crude protein and amino acid content. Research work at Oklahoma State University and other institutions has shown that wheat can be used very successfully as a swine feed when properly supplemented in the diet. A summary of several experiments shows that wheat has approximately 99% the energy value of corn.

Determining Relative Value

The overall value of a grain has to include the relative value of each grain on the basis of both energy content and protein as well as amino acid content. Thus since wheat is normally higher in crude protein and amino acid content than corn or milo, the relative value of wheat depends to some extent on the price of soybean meal and other protein supplements.

The nomograph presented on Page 3 gives the relative value of wheat to corn and milo with different prices of soybean meal (See Figure 1). Assumptions are made in the nomograph that wheat has 99 percent and milo 95% the energy of corn. The value of the additional protein and essential amino acids in wheat as compared to corn and milo is adjusted according to the price of soybean meal in determining relative values.

The following illustration is given to help use the nomograph when wheat is $4 per bushel and soybean meal is $200 per ton. Draw a straight line from $200 per ton soybean meal (left margin) through $4 per bushel wheat and extend the line to the right margin which gives various prices of corn milo. Thus, if wheat is $4 per bushel and soybean meal is $200 per ton, the equivalent price of corn is approximately $3.70 per bushel and the equivalent price of milo is approximately $6.20

Table 1. Typical nutritive values for certain cereal grains.

Grain	Crude Fiber	Metabolizable energy	Calcim	Phosphorus	Crude protein	Lysine	Tryptophan	Threonine	Methionine + Cystine
	%	Kcal/lb.	%	%	%	%	%	%	%
Corn, yellow	2.5	1550	.02	.25	8.5	.24	.09	.32	.40
Wheat, hard red winter	2.6	1475	.05	.30	12.2	.38	.17	.37	.50
Milo	2.2	1480	.02	.27	8.9	.22	.09	.27	.29
Barley	6.0	1380	.05	.34	11.5	.40	.15	.36	.37

per/ cwt. See the dotted line example on the nomograph. Thus under these conditions, a producer could get more economical gains in growing-finishing hogs by buying corn for less than $3.70 per bushel or milo for less than $6.20 per/cwt. Another example would be $4 per/cwt. milo and $220 per ton soybean meal. The equivalent value of wheat would be approximately $2.70 per bushel.

Effect of Rapid Cereal Grain Change

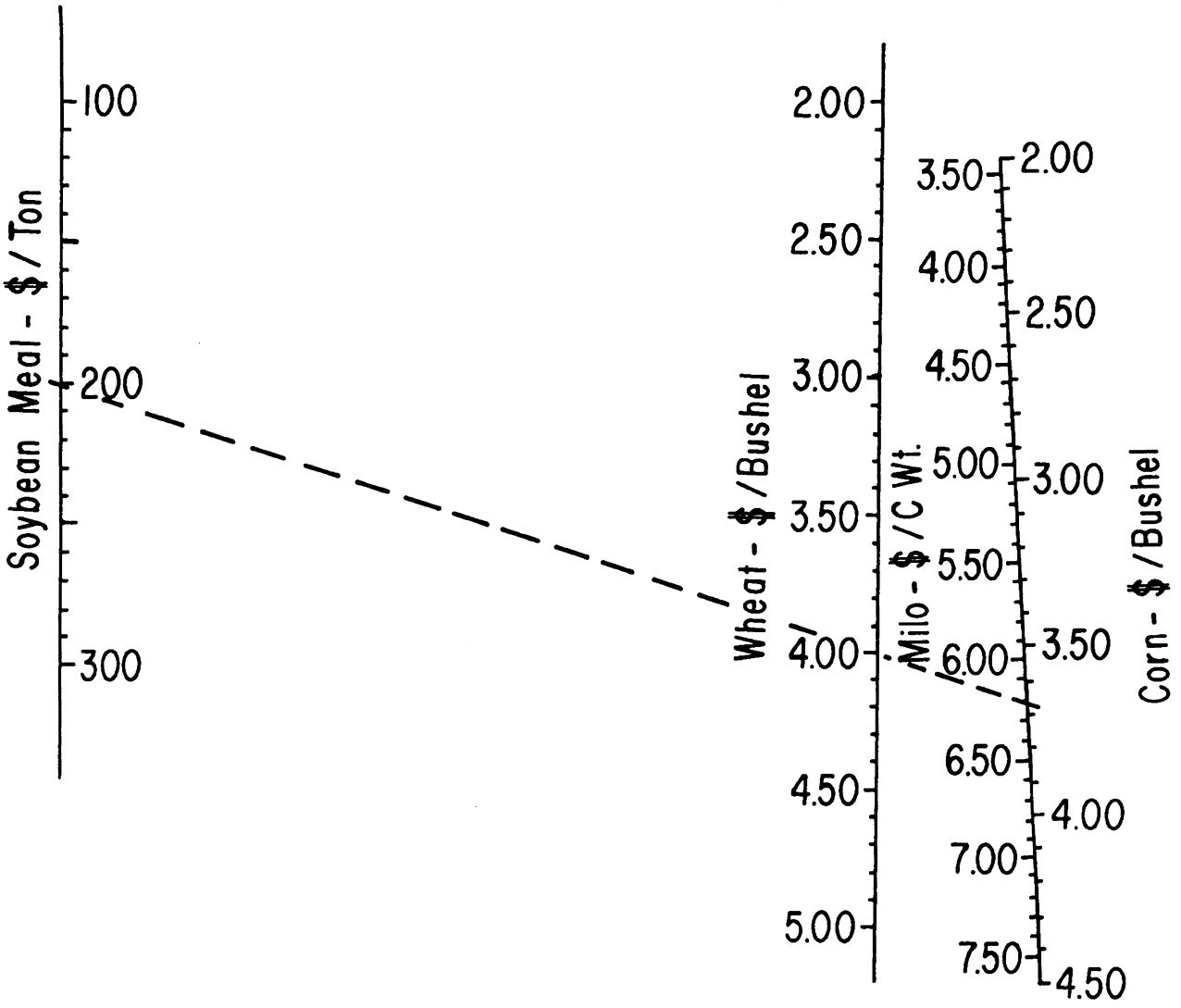
One of the concerns of pork producers in switching from one grain to another on the basis of economics is the effect of rapid change in feed ingredients on the performance of swine. Research has shown that a weekly rotation of corn, milo, and wheat in diets for growing-finishing swine had little effect on performance. Results of two trials demonstrated that average daily gain, feed intake, feed efficiency, and probed backfat thickness were nearly identical for pigs fed a constant standard milo diet as compared to those fed a diet in which the cereal grain (corn, wheat, or milo) was rotated every seven days. These data suggest that a pig does not need an adjustment period or gradual changes when changing grain sources.

Suggested Diets

Suggested diets for growing-finishing swine using wheat, corn, milo or a mixture are shown in Tables 2 and 3. It is important to balance swine rations for amino acids because the protein content of cereal grains is not directly proportional to amino acid content. Consequently, the protein content of these diets varies since wheat contains more crude protein than milo or corn. Even so, a certain amount of soybean meal or high quality protein supplement is necessary to bring the lysine content of wheat diets up to a recommended level.

Table 2. Suggested growing diets (40-125 lb).

	Diet Number					
Ingredients	1	2	3	4	5	6
Corn, yellow	1555	---	---	776	804	---
Milo (sorghum grain)	---	1549	---	776	---	800
Wheat, hard winter	---	---	1645	---	804	800
Soybean meal, 44%	395	400	305	397	342	350
Calcium carbonate	15	17	17	15	16	17
Dicalcium phosphate	25	24	23	26	24	23
Salt	7	7	7	7	7	7
Vitamin-trace mineral mix*	3	3	3	3	3	3
Total	2000	2000	2000	2000	2000	2000
Protein, %	15.30	15.70	16.70	15.50	15.90	16.10
Lysine, %	.75	.75	.75	.75	.75	.75
Tryptophan, %	.20	.20	.24	.19	.21	.21
Threonine	.58	.55	.56	.57	.57	.55
Methionine + Cystine, %	.54	.46	.59	.50	.56	.52
Calcium, %	.65	.66	.66	65.	.65	.66
Phosphorus, %	.55	.55	.55	.55	.55	.55
Metabolizable energy, kcal/lb.	1494	1438	1435	1465	1465	1437



Equivalent Values of Wheat, Corn, and Milo.

Figure 1. Nomograph of the relative value of wheat to corn and milo.

Nomograph drawn by James E. Garton, Professor Emeritus, Agriculture Engineering.

Table 3. Suggested finishing diets (125 lb to market).

Ingredients	Diet Number 1	2	3	4	5	6
Corn, yellow	1662	---	---	829	902	---
Milo (sorghum grain)	---	1649	---	829	---	852
Wheat, hard winter	---	---	1754	---	800	851
Soybean meal, 44%	290	304	200	295	251	250
Calcium carbonate	16	17	17	16	16	17
Dicalcium phosphate	22	20	19	21	21	20
Salt	7	7	7	7	7	7
Vitamin-trace mineral mix*	3	3	3	3	3	3
Total	2000	2000	2000	2000	2000	2000
Protein, %	13.40	14.10	15.30	13.70	14.20	14.50
Lysine, %	.62	.62	.62	.62	.62	.62
Tryptophan, %	.17	.17	.21	.17	.19	.19
Threonine	.51	.48	.49	.59	.51	.48
Methionine + Cystine, %	.50	.42	.56	.46	.53	48
Calcium, %	.61	.61	.61	.60	.60	.61
Phosphorus, %	.50	.50	.50	.50	.50	.50
Metabolizable energy, kcal/lb.	1499	1442	1439	1471	1472	1440

Table 4. Suggested vitamin-trace mineral mix*

Ingredient	Amount per pound premix
Vitamin A	900,000 IU
Vitamin D	100,000 IU
Vitamin E	5,000 IU
Vitamin K (Menadione)	660 mg
Riboflavin	1,200 mg
Pantothenic acid	4,500 mg
Niacin	7,000 mg
Viamin B12	5 mg
Choline Chloride	20,000 mg
Folic Acid	300 mg
Biotin	40 mg
Copper	.4%
Iodine	.008%
Manganese	.8%
Zinc	4.0%
Selenium	.012%

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