IV. DEHYDRATED ALFALFA FOR SWINE

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Alfalfa is an established ingredient for swine feeding, and prior to the introduction of vitamin and mineral premixes, was used as a source of important vitamins such as vitamin A (from carotene), vitamin E, riboflavin, pantothenic acid, choline and biotin, It has been shown that dehy is a valuable source of trace minerals such as selenium and manganese.

The nutritional characteristics of dehy for swine feeding are shown in TABLE 1. The values shown are mainly taken from the National Research Council (1982) publication on US-Canadian Tables of Feed Composition. These values are based on work with growing-finishing swine fed to appetite and may not be applicable to sows which are limit-fed. This probably explains the disagreement in the literature as to the actual energy values of alfalfa for swine. For instance, several researchers have shown that the metabolizable energy value of sun-cured alfalfa for sows is 50% greater than that quoted by the National Research Council. Therefore the digestible energy and metabolizable energy values for dehy as shown in TABLE 1 are based on data which have been shown to apply to sows.

TABLE 1: Nutritional characteristics of dehy for swine feeding (compared with barley, corn and soybean meal).

	Dehy	Barley	Corn	Soybean meal
		(as fed basis)		
		(% unless stated)		
Dry matter	90	90	90	90
Crude protein	17	11	8.5	44
Ether extract	2.7	1.5	3.2	1
Crude fibre	24	6.5	2.5	7
Nitrogen free extract	36.5	67.5	70.2	32
Ash	9.7	2.7	1.2	6
Calcium: total	1.4	0.05	0.02	0.25
Phosphorus: total	0.25	0.32	0.3	0.6
Digestible energy, kcal/kg +	1890	3170	3525	3350
Metabolizable energy, kcal/kg +	1650	2900	3325	3090
Lysine	0.71	0.38	0.26	2.84
Methionine	0.25	0.16	0.21	0.65
Methionine & cystine	0.43	0.43	0.37	1.32
Threonine	0.69	0.42	0.32	1.72
Tryptophan	0.27	0.15	0.1	0.59
Selenium, mg/kg	0.33	0.1	0.03	0.1

(Based on US-Canadian Tables of Feed Composition, National Research Council, 1982)
+Dehy values apply to sows only: values for growing-finishing swine are 1420 and 1200 respectively.

The inclusion of dehy or sun-cured alfalfa in swine diets is based on its nutritional value particularly when compared with barley or corn. In Canada barley is the major energy source in swine diets, while in the U.S. it is corn.

The protein content of dehy is 150% higher than that of barley and nearly twice that found in corn. Inclusion of dehy in the diet can therefore provide a saving in the amount of protein supplement required in the form of soybean meal or canola meal.

Research data from the U.S. indicate that dry sow diets formulated with dehy are compatable with and even constitute an improvement in health and productivity. Studies at the University of Guelph have shown that feeding dehy in the diet of sows may help to protect against the toxic effects of the mycotoxin zearalenone when present at levels of 10 mg/kg feed or less.

Dehy contains an abundant amount of the amino acid lysine, a limiting amino acid in pork production. The high level of calcium (1.4%) must be kept in mind when formulating diets for swine and additional phosphorus added to maintain the correct Ca:P ratio. However, while it is known that the phosphorus (0.25%) in dehy is completely available to the pig, the calcium has been shown recently to be only 21% available. Thus dehy has a comparable calcium level to that of soybean meal, and less phosphorus needs to be added to a diet containing dehy than was previously considered necessary.

A low level of dehy (2.5 - 5%) is recommended in most swine diet formulations as a valuable source of nutrients and "unidentified factors". Higher levels can be recommended for certain classes of swine, such as gestating (dry) sows.

These results indicated that a higher percentage of sows fed the alfalfa gestation diet completed the three reproductive cycles than those fed the control gestation diet (89% vs. 66%). No significant differences were observed in the number of live pigs per litter or stillborns, but the number live at 14 days was significantly increased (7.7 vs. 8.9) in the alfalfa fed group. A significant reduction in birth weight was observed in the alfalfa fed group (1.37 vs. 1.50 kg), but no significant effect was observed at 14 days of age. Weight gain during gestation was significantly greater in the control animals and lactation weight loss was lower in the alfalfa fed group (although the effect was not statistically significant). Feed intake during lactation was greater following the inclusion of alfalfa in the gestation diet though the effect was not statistically significant. The average interval (from weaning to next farrowing) was 130 days with alfalfa fed animals and 135 days with control animals. Conception rate was not significantly affected by treatments. Addition of tallow to the lactation diet did not reduce weight loss during lactation and resulted in a reduction in feed intake during this period.

During the 90 day gestation period when the sows were fed the test diet, those fed the alfalfa diet consumed an additional 36.9 kg feed/head (2.36 vs. 1.95 kg/head/day on average). This should be taken into account in calculating the economics of the alfalfa regime.

RECOMMENDATIONS ON SOW FEEDING

Up to 50% of a sow gestation ration and 5% of a sow lactation ration may consist of dehy.

The composition of the gestation ration should be adjusted so that it provides the digestible energy intake and minimal intakes of the other nutrients shown in the TABLE 4. With corn and soybean meal as the main ingredients, a level of 50% dehy can be used. A ration of 2.5 kg per head of the dehy-corn-soy mixture (c) will provide the required daily intake of nutrients (TABLES 4 and 5). A level of 50% dehy can also be used with barley and soybean meal as the main feed ingredients. A ration of 2.5 kg per head of the dehy-barley-soy (B) mixture will also provide the required daily intake of nutrients (TABLES 4 and 5).

TABLE 4: Recommended alfalfa based rations for gestating sows.

	Recommended daily intakes of nutrients+ (minimum)	Nutrients provided by (C)++ 2.5 kg of a corn-based diet containing 50% dehy	Nutrients provided by (B)++ 2.5 kg of a barley-based diet containing 50% dehy
Digestible energy, kcal	6,120	6,400	6,415
Metabolizable energy, kcal	5,760	5,860	5,880
Crude protein, g	216	393	381
Lysine, g	7.7	18.0	16.5
Methionine, g	2.1	6.5	5.7
Calcium, g	13.5	19.3	20.0
Phosphorus, g	10.8	15.3	15.3

+Based on "Nutrient Requirements of Swine" (1979) National Research Council, National Academy of Sciences, Washington, D.C.
++See Table 5 for detailed composition.

TABLE 5: Compositions of recommended dehy-based diets for gestating sows.

Ingredients (%)	Corn diet (C)+	Barley diet (B)+
Corn, ground	37.0	—
Barley, ground	—	41.3
Dehy	50.0	50.0
Soybean meal (44% CP)	9.3	5.0
Dicalcium phosphate (18:21)	1.5	1.2
Limestone, ground	0.7	1.0
Salt (iodized)	0.5	0.5
Vitamin/mineral premix++	1.0	1.0
	100.0	100.0

++Supplies per kg diet: 8,000 IU vitamin A, 550 IU vitamin D, 25 IU vitamin E, 8 mg riboflavin, 40 mg niacin, 30 mg pantothenic acid, 25 mcg vitamin B_{12}, 80 mg iron, 6 mg copper, 100 mg zinc, 25 mg manganese and 0.1 mg selenium.
+Suggested feeding rate 2.5 kg/head/day: adjust if necessary to maintain proper body condition.