P424 Manure management considerations for expanding dairy herds. C. D. Fulhage, University of Missouri, Columbia, Missouri.

Requirements and considerations for manure management in dairy operations transitioning to larger herds is discussed. Changes in manure production, collection, treatment, storage, transport, and utilization are addressed for dairy herds transitioning to larger numbers. Land area requirements for nutrient utilization increase with animal numbers, and a discussion of crop nutrient uptake, potential nutrient losses, and nitrogen vs. phosphorus limit for land application is included. Increasing herd size may require obtaining, updating, or revising environmental permits from the regulatory agency. Options for reducing manure loading on existing facilities as animal numbers increase are discussed. Economy of scale generally improves the cost/benefit ratio for manure systems as herds become larger. Economic analyses of lagoon manure management systems in Missouri show a cost of $0.43 per cwt of milk produced for 100-cow herds, and $0.27 per cwt of milk produced for 500-cow herds. Similar analysis for slurry manure systems shows a cost of $1.04 per cwt of milk produced for 100-cow herds, and $0.42 per cwt of milk produced for 500-cow herds. Increasing herd size can place new burdens on existing water supplies, and a discussion of alternatives to insure adequate water availability is included. As manure management systems become larger and more complex, required engineering design inputs and requirements become more extensive. Traditional engineering design and assistance sources such as university extension and NRCS (formerly Soil Conservation Service) may no longer be adequate. A discussion of methods of identifying and utilizing appropriate resources in the private consulting engineering sector is included.

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P425 **Effects of rumen undegradable protein (RUP) on dairy cow performance: A 10 year literature review.** F.A.P. Santos* and J.T. Huber. Univ. of Arizona, Tucson.

In 17 comparisons from 11 metabolism trials where soybean meal (SBM) was replaced by high RUP supplements, no significant benefits were consistently observed in terms of N, EAA, Lys and Meth flow to the duodenum. High RUP diets often resulted in decreased microbial protein synthesis. However, fish meal (FM) provided a good balance of Lys and Meth as a % of total EAA. In 88 comparisons from 60 lactation trials published in J. Dairy Sci. (1985-1994) on effects of replacing SBM with high RUP sources, such as heated and chemically treated SBM, corn gluten meal, distiller's grains, brewer's grains, blood meal, meat and bone meal, feather meal, or blends of these sources, milk yield and milk protein % generally were not improved. However, milk yields were increased in 5 of 11 studies when FM was fed to cows producing over 30 kg of milk/d.

Summary of effects of replacing SBM with high RUP sources.

	Milk yield, kg/d[a]			Milk protein, %[a]		
RUP source	-	0	+	-	0	+
All plant proteins	6	28	9	11	32	0
All fish meals	0	16	7	4	13	4
Animal byproducts	2	19	1	4	16	1

[a]Number of studies with significant negative (-), no (0), or positive (+) effects.

P426 Effect of rumen-bypass lysine and methionine on nitrogen utilization in early lactation cows. R. Blauwiekel*, S. Xu, J.Harrison - Washington State Univ,, Puyallup; W. Chalupa - U of Pennsylvania, Kennett Square; C. Sniffen - Miner Institute, NY; K. Watanabe, H. Suzuki - Ajinomoto Inc., Tokyo; and W Julien - Julien & Assoc., NE.

A metabolism study was conducted to determine if supplementation of early lactation diets with rumen-bypass lysine and methionine affected N utilization. The design was a 4 x 4 Latin square with two-wk experimental periods. Diets were formulated to provide either 89 or 102% of required methionine and 85 or 111% required lysine (Neg and Pos control diets, respectively). Bypass amino acid was added as a top-dress daily to the negative control diet to provide 8 g methionine and 27 g lysine (RPAA) or 13 g methionine and 40 g lysine (Hi-RPAA). The low level of RPAA tended (p=.12) to improve DM digestibility and resulted in yield of FCM comparable to the Pos diet. RPAA can be used in place of high quality protein sources when lysine and methionine are limiting in the basal diet.

Dietary Treatment	Neg	Pos	RPAA	HiRPAA	SEM
FCM, kg/d	39.8	43.1	43.2	39.4	2.9
Milk N, g/d	194	197	202	189	11.4
DM intake, kg/d	19.4	18.4	19.9	18.1	1.0
DM digestibility, %	69.5	72.3	70.7	69.3	.8
N digestibility, %	59.6	62.7	62.5	60.8	1.1