Progress Report on the Development of Systems Research of a Cow-calf System

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Systems research combines the effects of all factors and their interactions that are known to influence a production system. Mathematical relationships among the factors are developed to describe a production system. Presently, efforts are being made to develop the mathematical relationships to accurately describe a cow-calf operation.

To illustrate mathematical relationships, the amount of TDN required per day for a cow can be predicted as a function of the weight and age of the cow, level of milk production, stage of lactation and stage of pregnancy. From the amount of TDN required, percent of TDN in a feed source and calving date, the daily dry matter intake can be estimated. For example, assuming 49 to 59 percent TDN in the pasture during a

Table 1. Dry matter intake and TDN requirements of beef cows calving at 2 years of age.

Condition of cow	Body weight lb	Milk production[a] lb	Approximate daily dry matter intake[b] lb	TDN lb
Dry pregnant-middle third of pregnancy				
	731		11.95	6.62
	766		12.37	6.82
	817		13.00	7.17
Dry pregnant-last third of pregnancy				
	731		15.76	7.72
	766		16.35	8.01
	817		17.21	8.43
Lactating				
	731	9.6	20.64	10.95
	766	12.5	22.76	12.09
	817	14.5	24.90	13.22

[a]Based on crossbred cow data.
[b]Daily dry matter intake needed to achieve TDN requirement.

year, 2-year-old heifers calving in February and weaning age of 205 days, the daily dry matter intake and TDN requirements of a first calf heifer can be predicted (Table 1). However, dry matter intake is only part of a cow-calf system. Reproduction performance of the cow and bull, economic considerations, breed differences and growth of the calf are some additional factors needed to describe a cow-calf system.

At this time, mathematical relationships describing forage intake of calves from birth to weaning, weight gain of dry non-pregnant cows and breed effects are being developed to improve the prediction of the inputs and outputs of a cow-calf system. The final goal of this project is to use the developed mathematical relationships to predict the inputs and outputs of alternative management schemes.

Functional Properties of Bovine Hide Collagen in Coarse Ground Beef Sausage

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With the continuing development of the Third World nations, a need for labor-intensive industries to be utilized by them has led to shoe and leather manufacturing industries being established within their respective borders. This in turn has resulted in the decline of shoe and leather industries in the United States. To help combat this trend, new leather tanning processes have been developed, and ways of using surplus hides and hide trims are being explored. The excess hides and their trim contain food grade collagen, which is a valuable protein source. It is of great importance to find an economical and suitable outlet for this product. Food-grade hide collagen is manufactured from the flesh split of the hide, which is also used to make suede leather. The protein attained from the bovine hide collagen is not a complete protein; it lacks the essential amino acid methionine and is low in tryptophan. Therefore, the collagen should be used in conjunction with a complete protein. The experiment is nearing completion, and after computer analysis of the data, conclusions concerning the functional properties of the bovine hide collagen will be made.

"Cold" boned meat from a market cutter/canner grade cow was utilized. The meat was then ground through a half-inch plate and mixed in a 100-lb sausage mixer for 2 minutes. It was then divided into 10-lb units and double-wrapped in freezer paper and stored in a -16°F freezer. The 10-lb units were then randomly assigned differing levels of bovine hide collagen (0-10-20-30 percent). The units were mixed with the collagen and spices. The sausage mixture was then stored for 22 hours at 34°F. The sausage was then removed and stuffed into 2½-inch fiberous casings and cooked for 4 hours until an internal temperature of 155°F was attained, using a Blodgett convection oven. The sausages were removed from the oven and placed in a 40°F ice bath for 1 hour. After this cooling period they were removed, dried, and placed in a 34°F cooler for 16 hours.