Supplying Amino Acids to the Cow of the Future

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At a recent nutrition conference, a slide presented the gains in milk production per cow over the last century. **Production has steadily increased due to innovations in nutrition, management, and genetics, and is predicted to continue its climb for the next 10 years.** Using sexed semen, routine on-farm embryo transfer and genomics, the presentation predicted drastic production increases in the milk cow of the future.

As a nutritionist, my thoughts went to how we will supply the necessary nutrients to support these higher levels of milk. In the future, using these genetic tools, your whole herd may be equal to the top 10% of your current herd. With the demands of more genetically superior cows, **we must become better at fine-tuning diets to get the most out of every pound of feed.**

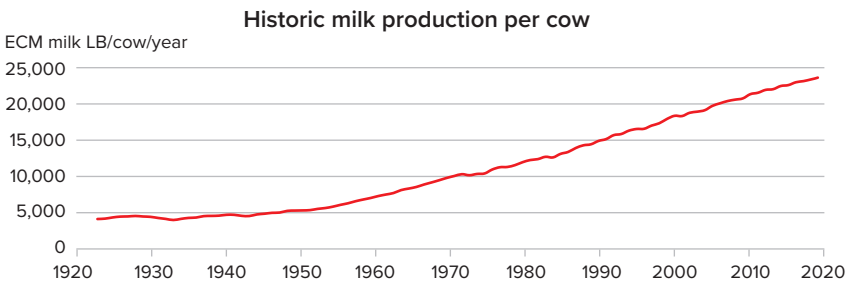
Meeting the needs for things like starch and fiber is relatively straightforward. The supply of various fatty acids and amino acids is more difficult. On the amino acid side, we must be sure to supply adequate amounts of lysine and methionine, in the correct balance. Let's look a little deeper into how the nutritionist uses the model to make decisions based both on biological and economic principles.

Picking from a long list of options, the formulator offers available grains, proteins, byproducts and forages to the model. The model considers the amino acid supply in each of the feedstuffs and predicts microbial protein production in the rumen.

There are two ways a nutritionist can build the ration. The first is to input a ration based on inventories, ingredient availability or simply by preference. The model will predict the milk output from this blend and indicate various deficiencies. The nutritionist can then make further adjustments to address these deficiencies. Many diets are successfully generated using this approach.

The second way to design a ration is to **use the linear program (LP) function and let the model solve for the best ration possible using the ingredients offered.** In this approach, ingredients are allocated to meet requirements at the lowest possible cost. Using the LP function, rumen-protected lysine and methionine products can compete with and be combined with amino acids in other ingredients including grains, proteins, and forages. Logistics should also be a consideration when replacing commodity ingredient amino acids with a more convenient premix or mineral blend.

In a recent field trial, we used this LP formulation approach to add AjiPro®-L to replace blood meal. This blood meal was bulk shipped to the dairy and it was not a good use of an entire commodity bay. So, we replaced the blood meal with a small amount of AjiPro®-L delivered in a mineral premix. **Using the LP, we were able to replace the blood and support the same lysine supply for no change in feed cost.**



The goal in this field trial was to replace the bay of blood meal and not add cost – goal accomplished. However, lysine supply still lagged behind energy. The next step for this herd would be to invest 6 cents of additional AjiPro®-L to elevate MP and lysine supply. The additional potential 2 lbs of extra milk will offer an excellent ROI on the 6 cents.

	Bloodmeal Ration	AjiPro®-L BM Replacement Ration	AjiPro®-L Full Lysine Ration
	LBS Dry Matter		
Corn silage 35 starch	15.8	15.8	15.8
Grnd corn 500mic	10.6	10.6	10.6
Wet dist grain	3.09	3.14	3.07
Alf haylage 21%	2.96	2.96	2.95
Soyhulls	6.34	6.36	6.40
Triticale silage	1.86	1.86	1.85
Canola meal	2.00	2.00	2.20
Soybean meal – 48%	1.87	1.87	1.64
Mineral mix	1.75	1.75	1.75
Corn gluten	1.49	1.49	1.50
Alf hay #1	1.00	1.00	1.00
Amino plus	1.00	1.20	1.25
Cottonseed whole w/lint	1.00	1.00	1.00
Cane molasses – liquid	0.58	0.58	0.57
Ca salt fa	0.44	0.44	0.41
Blood meal - good quality	**0.32**	**0.00**	**0.00**
AjiPro®-L Generation 3	**0.00**	**0.05**	**0.08**
	LBS Milk Supported		
NEL milk	80	80	80
Metabolyzable protein	78*	78*	80
Lysine	78*	78*	80
Methionine	80	80	80
Expected production	**78**	**78**	**80**
* Limiting nutrient			
Estimated cost, $/cow/day	$5.50	$5.50	$5.56

The goal of a good nutritionist is to supply the correct nutrients for the least cost to support the most profitable level of milk production. Modern formulation software allows this to be a very detailed process. Amino acids found in commodity ingredients like soybean meal or canola can be augmented by just the right inclusion rate of rumen-protected lysine or methionine. If we are to meet the nutrient supply needs of the cow of the future, we must employ this technique and take our ration formulation to the next level.