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WHERE'S THE VALUE IN ADDED LECITHIN?

The industry's daily quest to pump more energy through high-producing lactating cows without submitting them to metabolic breakdowns that accompany high-starch diets has spawned a creative search for new energy-loading feed ingredients. In the last few years, that search has led some to investigate the lipids and gums in soybeans—particularly lecithin—as a possible plant-based replacement for animal fats. Soy lecithin, one of the natural byproducts of bean processing, may offer some opportunities. However, the limited research on lecithin in dairy-cow diets has so far raised as many questions as it's answered.

INCREASE BYPASS PROTEIN? Not likely.

NEGLIGIBLE PROTEIN BYPASS EFFECT CONFIRMED

Does adding soy gums to processed meal improve protein bypass? West Central sent several run samples of SoyPLUS® with and without added lecithin to independent labs and confirmed what university research suggests: It creates little to no significant difference in bypass percentages.

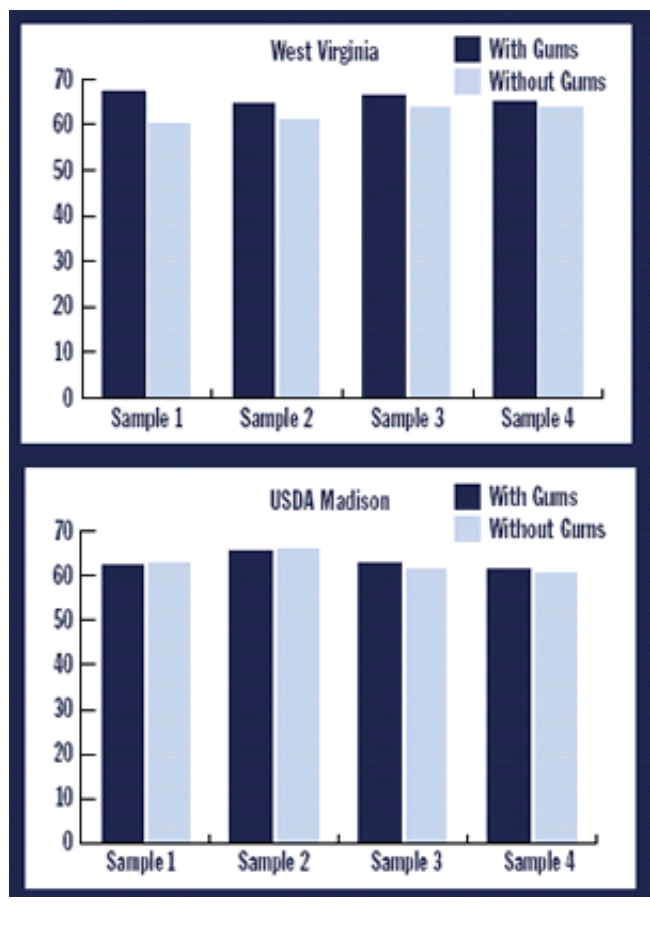
Work going back to the mid-'70s showed adding soapstock—another soybean fat similar to lecithin—slightly tended to decrease ruminal digestion of crude protein in beef cattle. A study from Nebraska in 1998, though, found adding up to 7 percent fat from a soapstock and lecithin combination in steer diets made no difference in crude-protein digestibility. With those two exceptions, there remains no support for any claim that application of soy lecithin or fresh gums increases rumen bypass of protein in dairy cattle. The effect of crude soy lecithin on ruminal protein digestion and lactating-cow performance remains as unclear today as it was a decade and a half ago.

ESCAPE RUMEN EFFECTS? Not appreciably. A 15-year-old study by Clemson dairy nutrition professor Dr. Tom Jenkins found feeding lecithin to sheep reduced ruminal fiber fermentation in the same manner corn oil would. At the same time, another contemporary study found adding lecithin to blended animal-vegetable fats in low-forage steer diets had the opposite effect, increasing ruminal fiber digestion. Dr. Jenkins' work did demonstrate some portion of that lecithin degrades slowly, suggesting a possible rumen-protected nature for that fraction. More recent work has tried to quantify the size of the fraction, without reliable success.

Encouraged by that bypass possibility, researchers considered whether lecithin that reached the hindgut might enhance digestion of esterified fatty acids and increase lower gut lipid digestibility of the total ration. And separate studies by University of Wisconsin's Dr. Ric Grummer and University of Maryland's Dr. Rich Erdman found evidence to suggest that: Infusing it directly downstream of the rumen improved average daily milk, milkfat or fat-corrected milk response. Now the bad news: Work since, including an unpublished study by Dr. Grummer and another from Nebraska, showed passing soy gums through the rumen can be expected to cause the same milkfat-depressing biohydrogenation interference as other vegetable oils. Lecithin is rich in the fatty acids that can be converted to trans fatty acids in the rumen and cause milkfat depression.

INCREASE BYPASS CHOLINE? No. The lecithin that comes from most soy processing plants contains about 17 percent phosphatidyl choline, which itself contains about 13 percent choline. Because it's hygroscopic, choline is even more vulnerable to the rumen's battering than amino acids. And even if an estimated 30 percent bypasses the rumen—a liberal assumption—that means 2 pounds of lecithin-enriched meal would add only 0.0494 grams of absorbed choline. A commercial bypass choline like Reashure[®], in contrast, provides a calculated choline hydroxide equivalent of 18.6 percent choline—about 75 percent of which bypasses the rumen—meaning 2 ounces fed to a cow daily would provide 8 grams of choline to the small intestine.

ANY BENEFITS? Slight. West Central does add small levels of soy lecithin to SoyPLUS—it's a natural part of the soybean and a product of the manufacturing process. Lecithin does offer a slight increase in ether extract and thus ration energy levels. But as is the case with most other feed components, lecithin forms just one small part of the intricate puzzle you must manage to create cost-effective rations. There are no secret weapons.



CONSULTANT'S CORNER

LECITHIN LEXICON LESSON



Dr. Phillip Jardon; West Central; Ralston, Iowa

At West Central, we have been getting questions recently about the value of lecithin. Nutritionists want to know if the soy lecithin added back to SoyPLUS decreases the need for by-pass methionine, replaces some bypass choline, and increases the amount of bypass protein.

The short answer to all three is “no.”

SoyPLUS does contain soy lecithin. The amount added back to the meal by our process is about 6 grams per kilogram. However, we believe that with the exception of a slight increase in ether extract and thus energy, added lecithin gives meal no additional production benefit.

Then why the questions? Some of the confusion surrounding soy lecithin arises from definitions. Lecithin lexicon can be confusing. To an organic chemist, lecithin is the phosphatide, phosphatidyl choline, or PC. But to an oil-seed crusher or his chemist, the term lecithin encompasses all the phospholipids, including not just PC, but also the closely related phosphatidyl ethanolamine, phosphatidyl serine and phosphatidyl inositol, in addition to other compounds that come out in the degumming process. Therefore, when someone in the crushing industry uses the term “soy lecithin,” he’s usually speaking not strictly of PC, but of soy gums.

This would not be a big issue if most of those gums were actually PC. At West Central, our lecithin—typical for the industry—is actually only about 67 percent phospho-lipids, the rest being mainly oil. Of that 67 percent de-oiled lecithin fraction, according to a 1991 study by our Clemson colleague Dr.

Tom Jenkins, only about 25 percent is actually PC. So the soy lecithin or gums referred to by a soybean-meal processor are really only about 17 percent—that is, 25 percent of 67 percent—PC.

By molecular weight, that PC consists of only about 13 percent choline—a relatively small contributor to cattle diets compared to, for in-stance, glycerophosphorylcholine, which consists of essentially a PC molecule with the two fatty acids removed. By contrast, its 40 percent choline by weight is more than three times greater than PC’s.

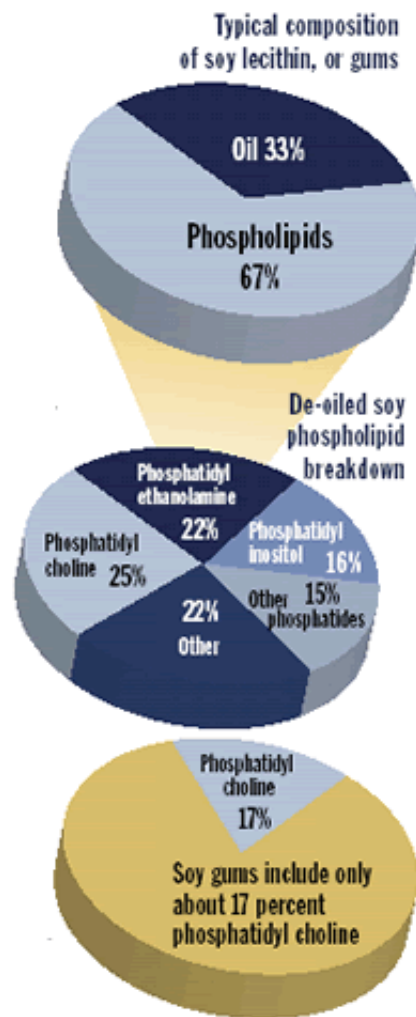
That means each 2 pounds of SoyPLUS or any meal-based product contains only about 0.15 grams of choline contributed by soy gums. And since the gums are applied to the outside of the meal, this choline would not be rumen-protected. Even if some of it were to escape the rumen intact, the choline supply and donated methyl supply is small compared to other sources of bypass choline and even normal natural dietary sources.

If I or anyone at West Central can answer additional questions you may have about the value of soy lecithin in feeds, please call me at 1-800-843-4769.

WEST CENTRAL HAPPENINGS

Nearly 500 members, business partners and special guests attended West Central’s 72nd Annual Membership Meeting at the Hilton Coliseum in Ames, Iowa, on June 25. The all-day event included educational breakout sessions, a trade show and dinner. The evening portion of the program included a state of the cooperative address by CEO Jeff Stroburg and an entertaining presentation by guest speaker and former NASA astronaut Colonel Mike Mullane.

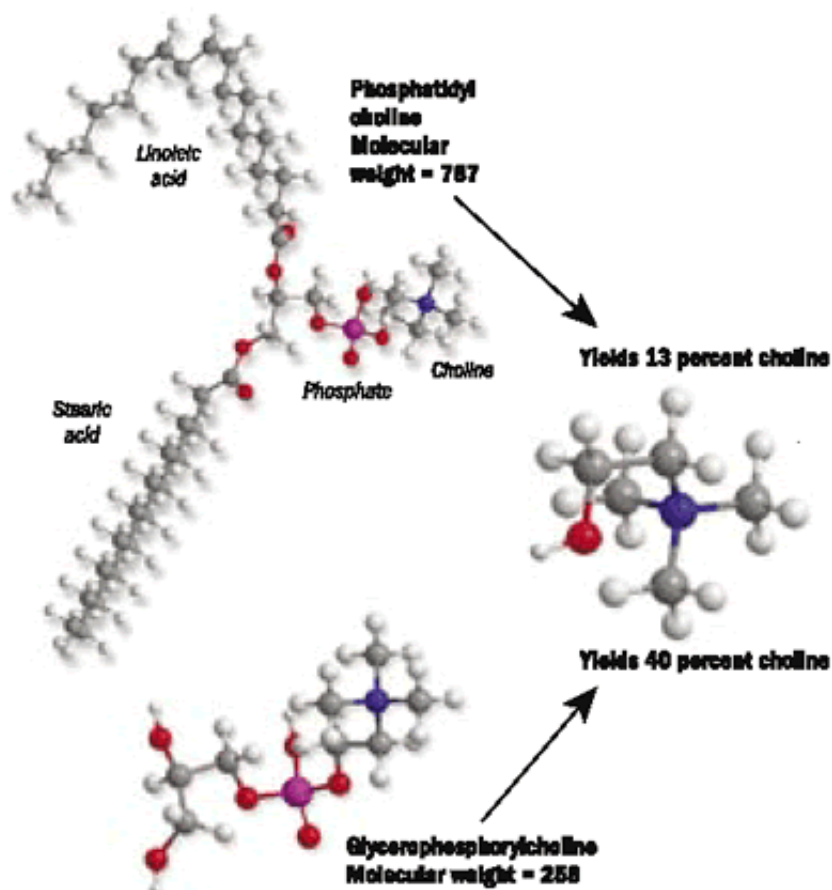
Afternoon breakout sessions featured industry experts addressing topics such as Asian soybean rust and increasing soybean yields, grain marketing, and biodiesel facts and figures. The trade show featured booths and industry representatives from organizations such as Land O’Lakes Feed, DOW Chemical and Syngenta.



FROM THE MATERNITY PEN

TRANSITION SODIUM AND POTASSIUM REMAIN COMPLEX

The complicated nature of DCAD management is illustrated by the debate that still exists regarding whether hypocalcemia can be controlled well enough by simply decreasing the sodium and potassium side of the equation before calving—without adding anything to the negative-ion side of the equation. The research doesn't provide much in the way of a conclusive answer, says Cornell animal scientist Dr. Tom Overton. Drs. Jesse Goff and Ron Horst showed in 1997 that reducing dietary potassium to 1.1 percent of dry matter for multiparous Jerseys prevented clinical milk fever without acidifying the diet. However, it did



nothing to reduce subclinical hypocalcemia. Michigan State research from 2000 showed that adding anionic salts the last three weeks of gestation to lower the ration DCAD to -150 mEq per kilogram (dry matter basis) prevented most cases of milk fever, without reducing intake or energy balance. Similarly, maintaining a zero-DCAD ration didn't hurt feed intake or energy status, but it was much less effective in preventing hypocalcemia.

Obviously, the starting point is to analyze feed ingredients, paying special attention to potassium and sodium content, and to select those with the least potential to raise the DCAD—where practical or even possible. The source of the potassium—whether from plant sources or from mineral sources—appears to have no affect on how well anions will work. The basal diet should begin with a DCAD below 150 mEq per kilogram. Next, adjust magnesium, sulfur, phosphorus and calcium. Once those levels are fixed, the only real variables in the equation become sodium, potassium and chloride.

Added chloride sources typically should target reducing the DCAD for non-heifers to from -50 to -100. Urine pH testing can then monitor the program to adjust for optimum performance.

During lactation, cows no longer need a low DCAD diet. Research indicates the milk production process itself acidifies the blood, so lactating cows actually benefit from a positive DCAD diet.

SOYCHLOR FOR REDUCED POTASSIUM AND SODIUM

West Central's SoyChlor[®] is naturally low in both potassium and sodium, as well as phosphorus. The relatively low cation levels make it easier to balance for DCAD while using on-farm feedstuffs that may bump up against the phosphorus ceiling if using other anionic salts. SoyChlor's relative low sodium levels offer the added benefit of controlling this ion known to also contribute to additional metabolic diseases. The hydrochloric acid used to manufacture SoyChlor is not only the most potent metabolic acidifier, it's also the most palatable source of chloride. That combination of power and palatability allows you to effectively lower ration DCAD without compromising dry matter intake.

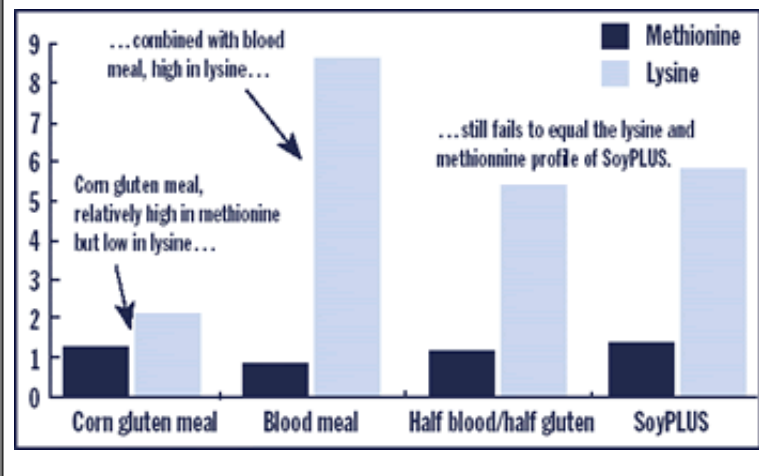
BEYOND BYPASS

A LITTLE MODERATION IN METHIONINE GOES A LONG WAY

The issue of lecithin’s role in methionine sparing punctuates the importance of understanding the real bypass profile of ingredients in order to carefully balance rations for amino-acid content. For milk production of 60 to 140 pounds per day, the Cornell Net Carbohydrate and Protein System predicts cows need 16.3 percent and 5.2 percent of total essential amino acids for lysine and methionine, respectively. Because microbial protein via rumen fermentation seldom provides that level necessary to support maximum milk yield, supplementation is necessary. Yet research by University of New Hampshire nutritionist Dr. Charles Schwab found that where lysine is predicted to be less than 14 percent of a ration’s total essential amino profile, additional methionine actually decreased both content and yield of milk protein. Randomly selecting high-bypass protein supplements without understanding their amino-acid profile can work against you. A little moderation isn’t a bad thing. For that reason, a protein supplement with a high-quality essential amino acid profile, such as SoyPLUS, offers great potential for improving lactation performance.

HELP SOLVE THE METHIONINE/ LYSINE DILEMMA

Producers who overcome gluten meal’s relative paucity of lysine by mixing it with blood meal still can’t match the essential amino acid profile of SoyPLUS.



QUALITY CORNER

HOW DOES WEST CENTRAL MAINTAIN ITS HIGH LEVEL OF CHLORIDE CONSISTENCY?

We have added a Digital Chloridometer manufactured by Labconco to the new SoyChlor plant in Jefferson, Iowa. Samples are analyzed hourly to ensure a constant chloride level. Results from May and June of 2005 are listed below.

	Percent	Standard Deviation
Chloride (N=111)	9.29	0.28

HOW DO YOU INDEPENDENTLY CONFIRM SOYPLUS QUALITY CONTROL?

In addition to our continuous monitoring using an in-house NIR, we send check samples to Woodson-Tenent Laboratories (WT) in Des Moines. Samples are also analyzed for bypass protein at Cumberland Valley Analytical Services (CV) in Hagerstown, Md., using an in situ method. Results from February to May 2005 are listed below. Values are recorded on an as-fed basis.

	Percent	Standard Deviation
Dry Matter (WT) (N=32)	89.14	0.80
Dry Matter (CV) (N=16)	89.62	1.00
Crude Protein (WT) (N=32)	42.64	0.69
Crude Protein (CV) (N=16)	42.57	0.67
Crude Fat (WT) (N=32)	6.18	0.29
ADF (CV) (N=16)	7.99	0.74
NDF (CV) (N=16)	17.12	0.99
ADFIP (CV) (N=16)	1.41	0.26
RUDM (CV) (N=16)	38.02	1.71
RUP %CP (CV) (N=16)	61.96	2.17



WEST CENTRAL®

406 First Street
 Ralston, IA 51459
 (800) 843-4769

www.west-central.com