



The Liquid Advantage ...in Feedlot Rations





LIQUID SUPPLEMENTS PROVIDE A RANGE OF BENEFITS TO FEEDLOT NUTRITIONAL MANAGEMENT:

- **ENHANCED NUTRITION**
- **IMPROVED PALATABILITY**
- **DIET UNIFORMITY**
- **ENHANCED RATION CHARACTERISTICS**
- **CONVENIENCE**
- **COST SAVINGS**

Enhanced Nutrition

Liquid supplements can provide supplemental protein, macro and micro minerals, vitamins and additives needed by high performing feedlot cattle with a high degree of flexibility to meet individual needs. These liquid supplements are protein containing suspensions of minerals and vitamins in a molasses based product containing as much as 70% dry matter. Regardless of nutritional needs, a liquid supplement can be formulated that is right for the situation.

PROTEIN

Liquid supplements can be formulated to contain as little as 4% to over 50% crude protein to balance ration requirements of high performing feedlot cattle. The protein is comprised of a mixture of NPN from urea and natural protein sources from other ingredients.

MINERALS

Readily available forms of macro and micro minerals are provided with QLF supplements. Feedlot suspension products provide fine-mesh calcium carbonate, soluble phosphorus sources (when needed), and are a natural source of potassium. Bioavailable sulfate and organic forms of micro-minerals are available to ensure optimal health and animal performance.

VITAMINS

Liquid supplements are ideal vehicles for including stable liquid vitamin premixes into feedlot diets. When warranted, thiamine may also be provided through a QLF liquid supplement.



FOCUS on Corn By-Product Diets

Corn by-product use in feedlot diets has expanded with the ethanol industry. They can serve as good energy and protein sources in feedlot diets and are high in readily digestible fiber which can be beneficial in reducing the incidence of acidosis. However, challenges presented by corn by-product feeding may include nutrient variability (phosphorous and sulfur content, fat content) and potential effects on carcass and meat quality. To optimize efficiency, these challenges must be met.

Efficient rumen fermentation depends on a consistent and steady supply of fermentable organic matter and nutrients. The inherent, inconsistent nature of corn by-products challenges the rumen system. QLF has demonstrated nutrient distribution can be improved by as much as 50% when a liquid supplement is incorporated into a feeding program. This improved ration consistency helps optimize rumen fermentation and cattle performance.

QLF supplements, used at recommended rates, provide sufficient calcium in most diets to balance the additional phosphorous supplied by corn by-products as well as balance the zinc and copper content of the total ration. Incorporating nutrients and additives in a liquid supplement, ensures uniform distribution with very little sorting potential. This promotes consistent nutrient and additive intakes.

Urea is an effective source of ruminally available protein to balance the protein needs in corn by-product diets. Corn by-products are relatively high in protein and when used in sufficient quantities are thought by many to require little or no protein supplementation. However, due to inconsistencies in or the lack of soluble protein, ruminally available protein may be limiting. Due to the fibrous nature of corn by-products, it is essential ruminal protein demands are met to maximize rumen fermentation as most rumen bacteria associated with fiber degradation require ammonia. Limiting ruminally available protein can reduce ruminal ammonia concentrations, impairing the ability of the bacteria to effectively utilize corn by-products.



QLF CORE Supplements: (CoProducts Ration Enhancers):

- Designed to balance rations containing corn by-products
- High in Calcium
- High in Trace Minerals
- Low in Phosphorus
- Available with approved ionophores and additives
- Address the specific nutrient concerns of corn by-product diets
- Offer flexibility to address specific nutritional concerns

Palatability

While palatability is hard to measure, there is no question that feeds with undesirable characteristics can reduce voluntary intake.

Feedlot rations can be dusty and unpalatable at times, especially when they are formulated without appreciable levels of fermented feedstuffs (e.g., silages, high moisture grains) or high-moisture co-products. Liquid supplements aid in tying up ration fines and masking off-flavors and odors. These palatability-enhancing characteristics of liquid supplements help start and keep animals on feed. Maintaining strong and consistent intakes provides for proper rumen function, better additive utilization, and improved feedlot performance.

Humid conditions can lead to palatability concerns due to ammonia release from feeds containing dry urea. Use of liquid supplements help avoid this concern as well.

Palatability is critical in starter diets, or with any other cattle under stress. The effectiveness of a well balanced diet or feed additive/medication is intake dependent.

Typically, QLF products for starter and grower cattle have a greater percentage of cane molasses compared to finisher supplements.

Molasses is highly palatable and supplies readily fermentable sugars. Incorporating these supplements in starting and growing diets helps get all calves on feed, and keeps them there.



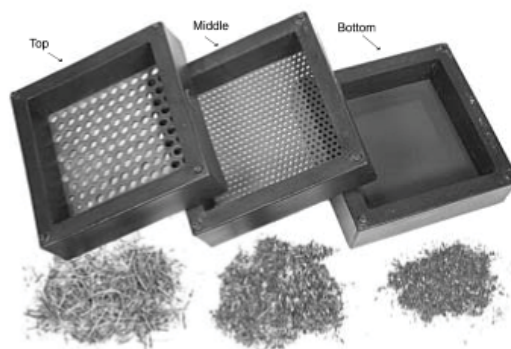
Diet Uniformity

Ideally, a ration would reach every animal exactly as it was formulated, with each bite throughout the day representing the desired mix of ingredients and additives. In reality, feedstuffs can separate in the bunk, and animals may sort for preferred portions of the diet.

Martin (1999) demonstrated in dairy cows how dramatically the diet consumed can vary from the diet delivered to the bunk. Using the Penn State Shaker Box to separate the total mixed ration into coarse, moderate and fine feed particles, cows tendency to sort a totally mixed ration was illustrated (see chart) by the decreasing proportion of moderate and fine feed particles in relation to coarse feed material remaining over time.

SHAKER BOX ANALYSIS SIX HOUR INTERVALS

	0 hr.	6 hrs.	12 hrs.	18 hrs.	24 hrs.
Top, %	9.3	13.7	21.5	27.5	58.7
Middle, %	47.0	42.3	41.6	38.9	26.7
Bottom, %	43.6	44.0	36.8	33.3	14.5



Nutritionists work to ensure that feedlot diets contain adequate roughage to maintain rumen health. If cattle don't consume that portion of their ration throughout the day, digestive upsets are sure to increase.

Subacute acidosis, which can be triggered by uneven and inadequate intake of roughage and additives (ionophores), reduces feed intake, and therefore performance. The following table represents projections made using Benchmark® performance data and current feed costs, illustrating the potential costs of subacute acidosis-induced intake reduction.

\$Bottom Line\$ - Subacute Acidosis Affects More than Intake

	Feed Intake Reduction, lbs/day			
	0	0.25	0.50	1.0
ADG, lb	2.97	2.93	2.90	2.82
COG, \$/cwt	\$83.05	\$83.39	\$83.57	\$84.08
\$/Hd lost	- - -	\$2.50	\$4.01	\$8.08
\$ Lost/5,000 hd	- - -	\$12,500	\$20,050	\$40,400
Assumptions: ration price \$9.50/cwt, yardage \$0.25/day, interest \$0.20/day, 5,000 head				

Acidosis also can lead to liver abscesses which can reduce daily gain 11% and feed efficiency 9%. **Lost carcass value due to liver abscesses (15% incidence rate) can easily be \$3.00 to \$7.00 a head.**

QLF has also demonstrated the superiority of liquid supplements in producing a consistent and predictable ration to maximize animal health and performance.

Effect of Supplement Form on Ration Predictability					
	Dry Supplement		Liquid Supplement		
Item	Range*	Variation	Range	Variation	% Greater Predictability
DM, %	74.65 - 75.60	0.96	72.96 - 73.66	0.70	27
CP, %	8.26 - 8.65	0.39	8.23 - 8.46	0.23	37
Ca, %	0.35 - 0.47	0.12	0.28 - 0.34	0.06	50
Zn, ppm	42.42 - 54.49	12.07	49.90 - 57.13	7.23	40

* Based on 95% confidence intervals of the data; 95% confidence the range represents actual ration in the bunk.

Additionally, South Dakota State University (Pritchard, 1993) demonstrated the performance benefits of liquid supplements in a finishing diet containing tylosin.

Liquid Supplements and Feedlot Performance		
	Dry Pelleted Supplement*	Liquid Supplement*
Dry Matter Intake, lb	22.4	23.4
ADG, lb	3.88	4.17
Feed Conversion	5.78	5.61
Abscessed Liver, %	17.5	8.8

*Tylosin supplied in a dry form. Pritchard, 1993

General Ration Characteristics

In addition to the positive effect liquid supplements have on ration sorting, the use of these products in a feedlot ration also helps to:

- **Tie up fines** - further increasing the uniformity of each bite consumed, helping minimize digestive upsets and maximize feed intake
- **Reduce dust** - reducing its action as an irritant AND cutting wind losses
- **Increase ration density** - providing needed supplemental nutrients without bulky, non-nutritive carriers

Convenience

A COMPLETE PACKAGE:

Liquid supplements simplify ration preparation by providing quality protein, minerals, vitamins, additives, and more in one easy-to-incorporate product.

EASE OF APPLICATION:

A simple toggle of an on/off switch allows liquid supplements to be easily and accurately applied to a ration batch. This increased level of control offers the potential for more accuracy than with supplements delivered through a slide gate or with a front-end loader.

STORAGE SIMPLICITY:

Because liquid supplements are nutrient dense, less total space is required for storage. Tank location and set-up can be modified to fit the needs of each situation. There are no bags or other packaging to handle. It is virtually impossible to cross-contaminate dry feed ingredients with medicated liquids. Liquid supplement storage tanks typically only need to be cleaned once a year (slow inventory turnover may dictate more frequent cleaning). Generally, QLF feedlot supplements do not require additional insulation or heat. Reversing switches on pumps, proper placement of valves, and use of appropriate pumps and pipe size will take care of most weather related issues. Extreme cold weather can make it necessary to provide added insulation or heat-tracing to either the storage tank, lines, and/or pump to keep the products flowing, especially for products containing added fat.

PRACTICAL CARRIER FOR DIETARY FAT:

Liquid supplements are capable of carrying additional fat to the ration, avoiding the need for special storage tanks or handling equipment for fat or oil ingredients. Adding fat through liquid supplements can also help avoid potential negative palatability effects of straight fat. QLF supplements can be formulated with added fat from either animal or plant sources.

Virtually any approved feed additive can be simply and accurately delivered to the ration via liquid supplements:

Rumensin®

Bovatec®

Cattlyst®

GainPro®

Tylan®

Melengestrol Acetate

Deccox®

Thiamin®

Rabon®



Cost Savings

OVERALL FEED SAVINGS:

Liquid supplements have been shown to improve feed efficiency. Pritchard (1993) demonstrated a 2.9% improvement (see page 6) while Perry (1989) reported that cattle receiving urea in a liquid supplement were 4.9% more efficient than cattle receiving a dry urea supplement. Additionally, Perry (1989) also reported that cattle receiving a liquid protein supplement were 4.5% more efficient than those supplemented with soybean meal.

Feedlot Performance by Source and Form of Protein Supplement			
	SOYBEAN MEAL	UREA	
	Control	DRY	LIQUID
0 - 55 Days			
DM Intake, lb	18.2	17.5	19.0
ADG, lb	2.71	2.38	3.00
Feed Conversion	6.72	7.37	6.34
0 - 129 Days			
DM Intake, lb	18.8	18.8	19.7
ADG, lb	2.71	2.69	2.98
Feed Conversion	6.94	6.97	6.63

Perry, 1989, Purdue University

LESS WASTE:

Application of a liquid supplement to a bunk ration can cut waste loss during both handling and feeding. Liquid supplements don't "shrink" in storage like dry supplements and fine feed particles are held safe from wind, promoting uniform and consistent intakes.

ECONOMICAL TO HANDLE:

The cost of storing, applying, and mixing liquids is lower than the cost of handling dry ingredients.

GOOD VALUE PER UNIT OF NUTRIENT:

Liquid supplements are cost-effective sources of supplemental nutrition and additives.

The Value of QLF

☑ **QUALITY PEOPLE**

Quality Liquid Feeds goes through great efforts to ensure that quality, customer oriented people are represented at each position within the company. We understand it takes the right people to provide the standard of service our customers deserve and expect.

☑ **QUALITY PRODUCTS**

When selecting a liquid feedlot supplement, each of the factors that define “quality” should be considered. The relative importance of each of these features will vary with cattle requirements, performance expectations, equipment capabilities and limitations, environmental conditions, inventory turnover rate, and management level. Customers should be aware of a feed company’s commitment to quality assurance, and know what product characteristics are critical to the success of their feeding program. The following items are just some of the items that you may use to define quality:

- ✓ **CONSISTENCY**
- ✓ **HANDLING CHARACTERISTICS**
- ✓ **NUTRIENT COMPOSITION**
- ✓ **STABILITY**

Suspension agents allow effective inclusion of ingredients and additives that would otherwise separate out of a liquid supplement. Manufacturers of liquid supplements currently have two main suspension agent alternatives: clays and gums.

Attapulgate Clay: The clay mineral Attapulgate (hydrated magnesium aluminum silicate) is composed of bundles of needle shaped crystals capable of suspension when properly hydrated. These individual crystals ionically interact to form a sheet-like structure that increases viscosity and thereby acts as a suspension agent.



Xanthan Gum: Xanthan gum is a high molecular weight polysaccharide or sugar. It is used in very small amounts in liquid supplements (along with a host of other items) as a true suspension agent. Once hydrated, xanthan gum forms a 3-dimensional net-like matrix suspending insoluble ingredients in the liquid supplement. Xanthan gum increases the viscosity (thickens) of liquid supplements at rest; however, when a shear force is applied the matrix behaves like a liquid making it pourable or pumpable. Removal of the shear force allows the suspension-gel to return, maintaining ingredient dispersion.

Xanthan gum suspensions exhibit a greater shelf-life than clay suspensions and tend to have greater overall suspension capabilities allowing greater nutrient inclusion. Xanthan gum/clay combination suspensions are capable of intermediate shelf-life suspensions.

Xanthan gum is the suspension of choice for all QLF main line products to achieve the highest suspension possible. However, good management practices dictate that liquid supplements should be properly stored and re-circulated. In addition, FDA mandates that medicated liquid supplements be re-circulated daily before feeding.

QUALITY LIQUID FEEDS

The “right” product needs to strike a balance between product quality and economy, and between expected costs and returns of various feeding strategies. Key considerations need to include:

- **The cattle -- current body condition, health status, genetic potential**
- **Performance expectations and stage of production**
- **Total ration composition**
- **Equipment and inventory capabilities**
- **Product turnover rate**
- **Additives shelf life**



QUALITY LIQUID FEEDS, INC.

Feedlot Program

PRODUCTS

STARTERS/GROWERS

NutriStart 26
ProStart 26
NutriGro 40

CO-PRODUCT BALANCERS*

CORE MAX 50
CORE MAX 40
CORE MAX 30
CORE MAX 20
CORE MAX 10
CORE PLUS 40
CORE PLUS 20
CORE FLEX 50
CORE FLEX 40
CORE FLEX 30
CORE FLEX 20

FINISHERS

NutriBeef 50
NutriBeef 25
ProBeef 50
Choice Beef 50
Choice Beef 44
Choice Beef 22

* **CORE** -- **CO**-product **R**ation **E**nhancer



- Where Quality Comes First -

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