FACTS NOT FANTASY – ALCOHOL IN LIQUID FEEDS

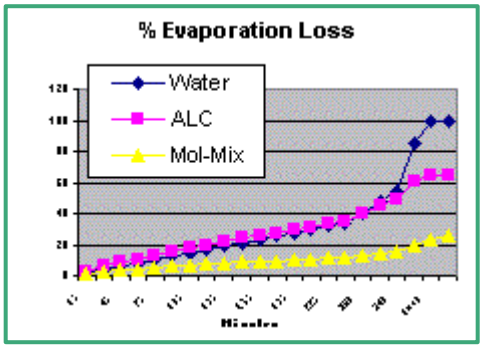
Alcohol (ethyl alcohol, ethanol) is being added to some liquid feeds as an energy source. Alcohol also reduces viscosity of a liquid mixture and helps suppress fermentation in high moisture ingredients.

Some marketers are claiming extremely high energy value for alcohol. The fact is that the energy of ethanol is greater than that of a carbohydrate, and less than that of fat. The amount of oxygen that can be consumed in complete oxidation determines the amount of energy potentially available from any nutrient. Ethanol can theoretically provide twice as much energy as an equal weight of a carbohydrate, and about 75% as much energy as fat.

However, there are several serious drawbacks to alcohol*:*

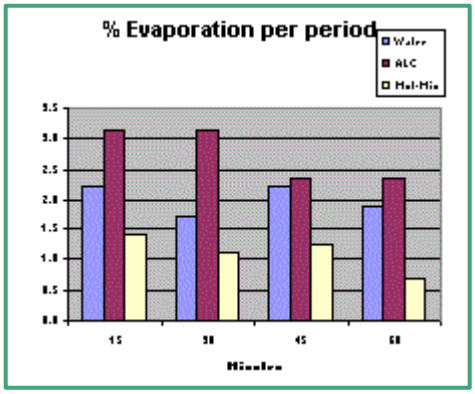
- · **Evaporation -**

Alcohol vaporizes more readily than water. Here are the results of a laboratory test on evaporation of water, Mol-Mix Synergy 20, and a commercially marketed liquid supplement containing 12.5% alcohol, which will be referred to as ALC. The supplement samples were stored in air tight containers until use. Triplicate 20 ml. samples of the liquids were poured on flat pre-weighed pans. They were exposed to air moving at 5 mph, at 66° F and 40% humidity, and were weighed at 15 minute intervals for the first 6 hours, then at longer intervals until weight loss from the ALC ceased.



These results show the first hour of data summarizing the rate of weight loss – the % evaporation during each 15 minute period. The rate of weight loss from ALC was initially more rapid than that of water because the alcohol in ALC evaporates so rapidly.

At the end of 1 hour, the ALC had lost 11% of its original weight while water had only lost 8%, indicating the greater initial evaporation of alcohol. The Mol-Mix had lost less than 5% weight, and unlike the ALC, none of that loss was of nutritional value.



This chart shows the cumulative weight loss over time. At the end of 24 hours (1440 minutes), ALC weight loss stabilized at 64%, meaning that its air dry weight after evaporation of water and alcohol was 36% of its original weight.

ALC literature states that it contains 50% water. Allowing for evaporation of the water and the alcohol this calculates to 37.5% dry matter. (100% - 50% water – 12.5% alcohol = 37.5%), indicating that virtually all the alcohol was lost in less than two hours of thin layer exposure.

The evaporation of alcohol from product in storage is not as rapid as it was in this study because liquid in a tank is not exposed to moving air, and is not in a thin layer as it was in this study. However, when the liquid is mixed onto feed, it is spread into a thin layer on the surface of the feed particles. After feed is exposed to air and heat, little alcohol can be expected to remain if the feed is not consumed within an hour of feeding.

- · **Danger of explosion**

The flash point of ethanol is 70° F. Ethanol fumes are explosive. This is why ethanol is used as racing fuel, and as an additive to improve the octane rating of gasoline. Alcohol fumes are heavier than air, so they accumulate in enclosed storage. Though rare, explosions from alcohol fumes from liquid feed have occurred.

- § **The Big Fairy Tale -- the Hydrogen Story**

The hydrogen story is the core fairy tale used by some proponents of alcohol in liquid feeds. They imply that hydrogen content is the measure of energy value. Here are some percentages:

% Hydrogen by weight

Protein	1
Fat	1.5
Sugar / Carbohydrate:	7
Ethyl Alcohol	13

You can see from this that the percentage of hydrogen in alcohol is greater than that in carbohydrates, fats, or proteins. However, that has little to do with energy value. Fats have about double the energy value of carbohydrates, yet the hydrogen content of carbohydrates is over 4 times greater than that of fats. *If hydrogen content were really associated with energy density, nutritionists would tell dieters to cut out vegetables and build their diets around gravy.*

Look at it from another angle - if something contained more hydrogen than alcohol, wouldn't it be better? Well, cattle do have a compound in their rumens that contains even more hydrogen than alcohol: Methane - 25% hydrogen. Methane contains twice as much hydrogen as alcohol. Yet it is a waste product of rumen fermentation. The microbes excrete it – they don't use all that hydrogen.

Bottom line - The hydrogen story is a lot of gas.

- · **No Proof**

There are no published peer reviewed studies by independent researchers showing a benefit to including alcohol in cattle feed.

Bottom Line: Alcohol probably has energy value for cattle, but a significant proportion of it will be lost before an animal can consume it.