TECHNICAL BULLETIN

DAIRY

QLF QUALITY LIQUID FEEDS

HEAT STRESS MAINTAINING DRY MATTER INTAKE

Heat stress occurs when a dairy cow's heat load is greater than her capacity to dissipate the heat causing the body temperature to rise. Effects of heat stress include: increased respiration rate, increased water intake, increased sweating, decreased dry matter intake, slower rate of feed passage, decreased blood flow to internal organs, decreased milk production and poor reproductive performance. Severity of heat stress is quantified using a temperature humidity index (Normal <72; Mild 75-78; Danger 79-83; Severe >83). Both ambient temperature and relative humidity are used to calculate a temperature humidity index (THI). Various combinations of temperature and humidity (Table 1) can produce the same THI. Temperatures as low as 75 °F can cause stress if the humidity is high (90%) but temperatures as high as 100 °F will not cause heat stress if the humidity is low (<10%).

QLF liquid supplements help reduce the effects of heat stress on the lactating dairy cow by maintaining dry matter intake through increasing the palatability and nutrient density of the ration; by providing needed electrolytes and vitamins to combat heat stress; and providing a high quality fat source to help maintain energy intake. Including MycoCurb® in your QLF liquid supplement reduces heating in TMR mixes to maintain palatability and dry matter intake and is a convenient way to get uniform distribution of the mold inhibitor. The feeding of MycoCurb® has been reported to increase the propionate level in the rumen.

Table 1. Temperature Humidity Indexes (THI)

	Relative Humidity, %										
°F	0	10	20	30	40	50	60	70	80	90	100
72											
74										72	73
76								72	73	74	75
78						72	73	74	75	76	77
80					72	73	74	76	77	78	79
82				72	73	75	76	77	78	80	81
84			72	73	75	76	78	79	80	82	83
86		72	73	75	76	78	79	81	82	84	85
88	72	73	74	76	77	79	81	82	84	85	87
90	72	74	75	77	79	80	82	84	86	87	89
92	73	75	76	78	80	82	84	86	87	89	91
94	74	76	78	80	81	83	85	87	89	91	93
96	75	77	79	81	83	85	87	89	91	93	95
98	76	78	80	82	84	86	88	91	93	95	97
100	77	79	81	83	85	88	90	92	94	97	
102	78	80	82	84	87	89	92	94	96		
104	79	81	83	86	88	91	93	96			
106	80	82	84	87	89	92	94	97			
108	81	83	85	88	91	94	96				
110	81	84	87	89	92	95					

Summer is the most challenging time of the year to keep feed intake up. Dry matter intake declines to lower internal heat production and this coupled with increased energy requirements to eliminate the excess heat can result in a severe reduction in milk production. These effects are interrelated with what happens in the rumen during heat stress. Reduced dry matter intake effects rumen function (feed digestibility, pH declines, VFA production declines, microbial protein production declines) and reduced rumen function reduces dry matter intake, cud chewing and saliva production.

In addition to cows not wanting to eat as much, feed goes out of condition faster due to mold growth. Common problems associated with feeding moldy feedstuffs are reduced dry matter intake, reduced feed efficiency, reduced reproduction and mycotoxosis.

Requirements that must be met for mold growth in animal feeds are an initial contamination of mold spores; oxygen must be present; the temperature between 32-100 °F; energy and nitrogen must be available; moisture in the form of "unbound" water must be present. The percentage moisture

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does not determine if there is sufficient moisture available to allow mold growth. Mold growth depends on the availability of “unbound” water. Bound water is that moisture which is associated so tightly with other molecules of feed that it is unavailable for use by molds. A TMR that has water added to it to increase the moisture content will spoil more rapidly than the same moisture TMR where the moisture comes from the ingredients.

Mycotoxins are a secondary metabolite created by certain species of molds that are toxic to organisms other than the mold itself. They are very potent chemicals and can produce toxic effects at very low levels (ppm or ppb). Mold growth can and usually does occur without production of mycotoxins, but mycotoxin production is always a potential when mold growth occurs. Once present, mycotoxins are very stable and are not destroyed even when heated to 650 degrees F. While mycotoxin production happens less frequently, it can lead to serious toxic effects, having catastrophic effects on commercial animal production.

In general, aflatoxin is the major concern in the lactating dairy cow because it is excreted in milk at a much higher rate than the other mycotoxins. Experiments with lactating cows showed cows excreted approximately 0.91% of the ingested aflatoxins into the milk. The FDA has set a maximum level of 0.5 ppb for milk and 20 ppb in the total diet dry matter. If one mycotoxin is present, there is a good possibility that others are present also. Combinations of mycotoxins can cause a problem at lower dosage levels than a single mycotoxin. If a sample tests positive but is below the level that should cause a problem, there is still reason for concern. The fact that it is present indicates the proper molds are present and the conditions have been right for mycotoxin production. If the conditions are right, the level can increase rapidly. The producer should watch closely for the appearance of clinical signs.

Good quality grains should be stored at less than 14% moisture since moisture and oxygen are needed for spore germination and mold growth to occur. While in storage, feeds must be either dry, oxygen free, fermented or treated with a mold-inhibiting chemical. Silage is stable under acid, anaerobic conditions. If either of these two conditions is changed, the silage is no longer stable and unwanted nutrient utilizing microbial growth can take place. In theory, silage is only exposed to air during feed out. However, the exposure time depends on many silage management factors (moisture, maturity, cut, compaction, filling method, use of silage additive or preservative, structure, weather at ensiling and feed out, rate of filling and feed out, exposed surface etc.). Thus the bunk life should be measured from the time the anaerobic conditions are broken until animals ingest the feed. Proper removal and feeding of the silage from the silo will help minimize secondary fermentation. Good feed bunk management will prevent moldy feed from accumulating in the trough.

An efficient preventive program is composed of two prime factors: good management and an effective mold inhibitor. Neither alone can prevent mold development in feed and feed ingredients, but when properly combined, a substantial reduction in the risk of mold damage can be obtained. Propionic acid is recognized as the best single mold inhibiting acid. It is particularly effective against Aspergillus, which may produce the toxins Aflatoxin and Ochratoxin. Benzoic acid and sorbic acid are effective against bacteria and work in synergy with propionic acid. In Kemin MycoCurb®, ammonium hydroxide buffers the propionic acid to form ammonium propionate, stabilizing both the ammonia and propionic acid and greatly reducing the corrosive properties and volatility of propionic acid. Forty to 60% of straight propionic acid can be lost due to evaporation during