Toxic compounds add to stress effects

LANCASTER — If the definition of stress includes all factors that exert a negative influence on health or well-being, then this includes toxic compounds found in dietary ingredients whether from natural or added sources, according to David A. Richie, manager of veterinary services, International Minerals & Chemical (IMC) Animal Health and Nutrition Division.

Speaking to an IMC-sponsored animal nutrition and stress conference, Richie lists five of the more common compounds of concern to the feed industry: lead, mercury, cadmium, vanadium and fluorine.

Lead

"Lead is a major environmental pollutant and is incriminated as a cause of accidental poisoning in domestic animals more than any other substance," he says. "Used motor oil as well as diesel fuel is often used as a dust control agent for fertilizer grade phosphate and potassium products. These fertilizer grade materials sometimes find their way into animal feeds, thereby increasing the stress load from toxic elements."

General signs of lead toxicity in all species are due to derangement of the central nervous system, gastrointestinal tract, muscle coordination and red blood synthesis, he says. Maximum tolerable dietary level for lead is considered to be 30 ppm for most species.

Richie cities a study, however, that reports the prevention of growth depression from lead in chick diets by increasing levels of dietary calcium and phosphorus to 2.7% and 1.8% respectively. (1980, Berg, et al.)

Mercury

Toxic signs in chickens include central nervous system damage, abnormal egg shells, decreased hatchability, changes in immunological responses, impeded growth and mortality, Richie says, adding that "mercury is currently not considered essential for living organisms."

The suggested maximum tolerable dietary level for domestic animals is 2 ppm mercury for both organic and inorganic forms.

Cadmium

Cadmium has been listed as "Highly Toxic" in the Guidelines Suggested for Contaminants in Individual Mineral Feed Ingredients" published by the Association of American Feed Control Officials.

In young animals, cadmium can cause reduced growth rate, anemia, neutrophilia, lymphocytopenia, enteropathy, renal tubular damage, bone marrow hypoplasia, decreased granulation of the adrenal medulla, hypertrophy of the heart ventricles, hypertension and spleenomegaly.

Cadmium toxicity is affected by the presence of other metals during or prior to cadmium exposure. "For instance," Richie says, "cadmium-induced anemia can be prevented by excess iron, and cadmium-induced acute testicular necrosis can be prevented by zinc, cobalt or selenium.

"Another factor affecting metabolism and toxicity of cadmium," he adds, "is nutritional state. Absorption of cadmium from the gastrointestinal tract is increased in calcium and iron deficiencies."

Cadmium may be present in phosphate rock used for animal feed and fertilizer. Dicalcium phosphate manufactured from Florida rock typically contains 4-6 ppm cadmium while the same product from North Carolina rock may contain up to 40 ppm cadmium. Dicalcium phosphate manufactured from Idaho-mined ore, says Richie, can contain up to 75 ppm cadmium.

Maximum tolerable level in complete feeds is limited to 0.5 ppm.

Vanadium

Vanadium, at low levels, meets the criteria for essentiality, says Richie. However, high levels can cause diarrhea, dehydration, emaciation prostration and death. The required level of vanadium for optimum animal performance is 0.1 ppm or less in the total diet. And, "since most diets made up of practical ingredients contain at least this much vanadium, a deficiency is not likely to occur under normal feeding conditions."

The most common feedstuff which could supply a level of vanadium of concern to the livestock industry is phosphorus, he adds. "Most phosphate sources do not contain potentially toxic levels of vanadium when fed at recommended levels. But," Richie cautions, "phosphate rock from Idaho can have vanadium levels up to 1400 ppm which, in some cases, could exceed the maximum tolerable level for total dietary vanadium.

"Values taken over the past few years show that IMC Florida reserve phosphates contain from 115 to 250 ppm vanadium," he says. "Thus, if these phosphates are added to diets at 1%, they will add a maximum of 2.5 ppm vanadium to the total diet, and on the average less. If phosphate from western reserve rock is added at 1%, up to 14 ppm added vanadium may be included in the diet which is above the amount studies above the amount studies show adversely affects egg production and quality." (The maximum tolerable level of vanadium for poultry is 10 ppm.)

Fluorine

Fluorine is the most active halogen and rarely occurs free in nature, but rather in the combined form of flourides. These are widely spread in nature and animals normally ingest small amounts with no ill effects. Excessive ingestion causes toxicity especially in the form of damaged teeth and bones.

Acute fluoride toxicity is rare. But in the past, Richie says, the most common cause in animals was from accidental ingestion of a rodenticide (Na fluosilicate or fluoroacetate) or overdosing with sodium fluoride, a swine acaracide. Cases of chronic fluoride toxicity have occurred from high fluorine phosphate compounds. In order to protect against fluorine toxicity induced by feed grade phosphates, the fluorine content of these minerals is controlled by the Association of American Feed Control Officials.

Farmers to receive $12.29 for milk

NEW YORK, N.Y. — Dairy farmers who supplied milk plants regulated under the New York-New Jersey marketing orders during June 1984 will be paid on the basis of a uniform price of $12.29 per hundredweight (26.4 cents per quart). Market Administrator Thomas A. Wilson also stated that the price was $12.26 in May 1984 and $12.61 in June 1983. The uniform price is a marketwide weighted average of the value of farm milk used for fluid and manufactured dairy products.

The seasonal incentive fund removed $.40 per hundredweight from the dairy farmers' uniform price for June, a total of $3,984,489.38. Deductions from this fund for March through June 1984 aggregated $13,182,480.65. The fund, plus interest, will be distributed in the August through November uniform price calculations.

A total of 16,835 dairy farmers supplied the New York-New Jersey Milk Marketing Area with 996,122,345 pounds of milk during June 1984. This was a decrease of 4.0 percent (about 42 million pounds) from last year. The gross value to dairy farmers for milk deliveries was $123,937,096.16. This included differentials required to be paid to dairy farmners but not voluntary premiums or deductions authorized by the farmer.

Regulated milk dealers (handlers) used 351,532,749 pounds of milk for Class I, 35.3 percent of the total. This milk is used for fluid milk products such as homogenized, flavored, low test, and skim milks. For June 1984, handlers paid $14.32 per hundredweight (30.8 cents per quart) for Class I milk compared with $14.76 a year ago.

The balance (644,589,596 pounds or 64.7 percent) was used to manufacture Class II products including butter, cheese, ice cream, and yogurt. Handlers paid $11.98 per hundredweight for this milk.