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Moldy Feed - Good or Bad

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Molds develop in feed in response to the nourishment they get from the feed. They develop only in the presence of air and as the result of favorable moisture conditions, which must be above a relative water vapor pressure equivalence of 65 to 70%. They develop very slowly at near-freezing temperatures and rapidly as temperatures rise. By enzyme action, they convert the energy components of the feed (carbohydrates, fats and proteins) into their own body structure with loss to the air mainly of metabolically-generated heat, water, carbon dioxide, ammonia and of fragments of their body as spores. They may or may not produce chemicals toxic to animals, which will remain with the mold in the feed. Their overall effect is to lower the total energy content of the feed, replacing some of it with their own body structure and by-products.

Despite the loss of total energy (i.e., feed weight loss) and barring the formation of toxic chemicals, the nutritive value of feed on a weight basis may remain unchanged or be improved by mold action if the process is stopped early. At the start, molds grow rapidly in response to the availability of readily utilizable nutrients and at that time their body tissue is young and most active enzymatically on the feed. Thereafter with the depletion of these nutrients, growth is slowed and proportionately more secondary and less nutritive changes take place in the composition of the mold body as well as in the feed.

Improvements in the nutritive value of moldy feed are largely the result of changes in the composition of its total protein. Mold protein can be up to 50% water soluble (as free amino acids and peptides) while feed protein is mainly water insoluble. Further, the relative proportion of various amino acids in the moldy feed usually is different from that in nonmoldy feed. This is believed to account for the improved growth and feed utilization efficiency that we got when we fed broiler chicks and Japanese quail molded soybeans at 50% of their diet. Similar benefits are believed to accrue to the oriental people who regularly consume controlled, mold-fermented soybeans called Tempeh, Miso, Sufu and other products as part of their regular diet.

Harmful or nonbeneficial effects of moldy feed usually are the result either of toxins generated by the molds or of significant reductions in the total energy value of the feed or a combination of both. Toxins may be chemically-characterized compounds generated by specific molds that happen to develop in the feed as the result of some unknown special condition, or they may be a conglomerate of fungal by-products from several molds that develop in the feed and render the feed unpalatable and indigestible. There are about 20 toxins of the first category that affect

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farm animals and man, producing such varied responses as liver and kidney lesions, internal hemorrhages, convulsions, vomiting, abortion, excess salivation, vulvovaginitis, and liver cancer. Those of the second category have not been characterized. Our test of 392 strains of 132 species of just one genus of mold (Aspergillus) commonly found in soil and in feed showed that nearly one-half of them when grown on wheat and soybeans were toxic to mice and/or chicks. Most of the others were neutral to these animals and a few strains were beneficial to growth.