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MYCOTOXIN TOLERANCES IN FOODSTUFFS

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Abstract - In most countries general legislation on food (and feed) prohibits the sale of products containing poisonous or harmful substances,which would include relevant mycotoxins as well.So far only aflatoxin has been dealt with specifically in legislation. The aflatoxin control may include all foods (and feeds) but is limited in most countries to certain commodities likely to be heavily contaminated,viz. oilseeds and derived products.The aflatoxin tolerances established for foods vary from zero (level set by analytical method) through 30 ppb to 50 ppb.Tolerances for feeds are generally higher.

INTRODUCTION

In the discussion to be presented here the action taken by a great number of countries regarding mycotoxins in foodstuffs (food and feed),under legislative provision or code of practice,are considered.As it will appear only aflatoxin has been dealt with specifically so far, but other mycotoxins are likely to be included in the future.

TOLERANCES IN FOODSTUFFS

More than 150 species of filamentous fungi (moulds) include producers of toxic secondary metabolites (mycotoxins)(Ref.1).Several of these mycotoxins are extremely toxic and some are potent chemical carcinogens.Several mycotoxins have been found as natural contaminants of foodstuffs,and concern has been expressed as to the hazard associated with food-borne mycotoxins. As general legislation on food in most countries prohibits the sale of products containing harmful substances,governmental attempts have been made in order to control the problem of mycotoxins in foodstuffs.

Multi-mycotoxin concept

In the Soviet Union a procedure has been suggested aiming at the control of foodstuffs,in particular feed,for mycotoxins in general ("fungal-produced toxicity")(Ref.2).The procedure was primarily based on the rabbit skin test. The level of toxicity in feed lots was established according to an arbitrary scale describing the dermal inflammation induced by extract of the foodstuffs,and the decision regarding the feed lots was made according to the toxicity level.The extent to which this procedure has been in practical use is at present unclear.

Individual mycotoxins

The only mycotoxin dealt with specifically so far in legislation and regulations is aflatoxin,according to a recent investigation carried out by the Food and Agriculture Organization(FAO)(Ref.3).

Aflatoxin.It appears that aflatoxin tolerances have been established in a number of countries covered by the aforementioned investigation(Ref.3),as indicated in Table 1.Some countries include all foods and feeds in the control(Japan,Malaysia,Poland,Sweden,USA),whereas only a few food commodities likely to be heavily contaminated,such as oil seeds,are covered in other countries(Canada,Denmark,India,Italy,Malawi,Norway,Rhodesia,UK).A few countries have only established tolerances for feeds (Belgium,France,Israel), and some countries have established tolerances for export commodities in particular (Brazil,India).

TABLE 1.Aflatoxin tolerances in various countries(see Note a)

Country	Commodity	Tolerance for aflatoxin(B_1)(ppb)	
		established	set by sensitivity of analytical method
Belgium	All feeds	40	+
Brazil	Peanut meal(export)	50	
Canada	Nuts & nut products	15[b]	
Denmark	Peanuts & Brazilnuts	5-10	+
	Feed(see EEC tolerances)		
France	Feed(see EEC tolerances)		
India	Peanut meal(food)	30[c]	
	Peanut meal(feed) (export)	1000	
Israel	All feeds	20	
Italy	Peanuts(import)	50	
Japan	All foods	10	+
	Peanut meal(import)	1000	
Malaysia	All foods	zero	+
Malawi	Peanuts	5	
Norway	Oilseed meal(import)	600	
Poland	All foods & feeds(import)	5	+
Rhodesia	Peanuts	25	
	Feed	50-400	
Sweden	All foods	5-10	+
	Peanut meal	600	
U.K.	Peanuts	50	
	Peanut meal	0-500	
U.S.A.	Consumer peanut products	15[b]	
	All other foods & feeds	20[b]	

Note a.Cited from Ref.3.
Note b.Total aflatoxins (B_1 + B_2 + G_1 + G_2).
Note c.Based on PAG Recommendation(Ref.5).

Recently the European Economic Community has established tolerances for feeds,as indicated in Table 2 (Ref.4).All nine memberstates of EEC will now have to incorporate these tolerances in their national legislation on feeds. The tolerances indicated in Table 1 are in some cases set by the sensitivity of the analytical method employed.In one case (India) the tolerance has been established in accordance with the recommendation of the Protein Advisory Group of FAO/WHO/UNICEF (Ref.5),who in an attempt to recognize simultaneously the need for protein,stated that the protein-rich food should not contain more than 30 ppb of aflatoxin.In other cases the food tolerances seem to have been set simply in order to keep the aflatoxin content as low as practically possible.The high tolerances for feeds in some countries,e.g. Japan, Norway,Sweden,are encumbered with detailed instructions concerning maximal incorporation of suspect ingredients during mixing of feeds,assuring a low level in the final feed.
The establishing of the low EEC tolerances for feeds (Table 2),designed in particular in order to avoid "carry-over" of aflatoxin into foods of animal origin,has created considerable concern among oilseed exporting developing

TABLE 2. E.E.C. tolerances for feeds(see Note a)

Commodity	Tolerance for aflatoxin B_1 (ppb)
Straight feed	50
Mixed feed for cattle,sheep & goat	50
Mixed feed for pigs & poultry	20
Other mixed feeds	10
Complementary feed for dairy cattle	20

Note a.Cited from Council Directive of the European Economic Community(Ref.4).

countries(Ref.3).
The causal association of food-borne aflatoxin and human liver cancer seems to have been convincingly established in geographical areas in Africa and Asia with high incidence rates of primary liver cancer,where values of dietary aflatoxin intake in the range 3 - 222 ng/kg bw/day are encountered(Ref. 6).It is difficult,however,to establish a possible causal role of aflatoxin in geographical areas,where the incidence rate of primary liver cancer is very low,as in Europe and North America,and where the dietary aflatoxin intake undoubtly is very low.The point of view has been raised that the human liver might not be the sole target organ for tumour induction by these low levels of aflatoxin(Ref.7).These matters illustrate the difficulties in establishing undisputable aflatoxin tolerances,underlined by the pronounced variation in tolerances from country to country,as indicated in Table 1.

Other mycotoxins.Data on natural occurrence,toxicity,and causal association with naturally occurring diseases in man and animals are at present accumulating on several other mycotoxins,e.g. patulin,ochratoxin A,sterigmatocystin,aiming at an evaluation of the hazard of these compounds as food contaminants.But so far no tolerances for other mycotoxins than aflatoxin have been established.

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