

## LEGISLATION AND QUALITY CONTROL OF FEEDS: THE EXPERIENCE OF ASIAN COUNTRIES

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There are numerous factors which contribute to the low productivity of animal production countries. One major constraint is the high population density and the competition of human and livestock for feed resources. Also there is a one-sided development - most developing countries have significantly improved their breeds and numbers of livestock, particularly swine and poultry. There has however been no real increase in animal or human feed production and no economically viable feed substitutes have been developed. Undernutrition is still the major limitation to increasing livestock production in these countries. Because of the high cost of feed ingredients, the available feeds are usually low in metabolizable energy and protein. In some instances and even with apparently adequate feed supply animals have been observed to deteriorate. This may be attributed to at times poor quality feed ingredients and a wide variability in nutrient composition often leading to subclinical nutrient imbalances, deficiencies in essential nutrients and/or toxicities associated with mycotoxins or salmonella leading to ill-thrift.

### Problems in supply and quality of feeds

Feed supplies depend on government policies. Feed supplements/additives such as vitamins, trace minerals, amino acids, medicants, antioxidants, etc. are generally imported. Bangladesh, India, Indonesia, Malaysia, Pakistan, Philippines, Singapore and Sri Lanka are generally in short supply of grain and/or protein meals. These same countries, which are heavily dependent on imported feeds, also export feed ingredients primarily to earn foreign currencies. Except for Thailand, all Southeast Asian countries import maize, most of their fish meal and all of their soyabean meal but export agro-industrial by-products such as cotton seed cake, copra meal, rice bran, molasses, etc. India, Bangladesh, Pakistan and Sri Lanka have a variety of protein concentrates such as oil cakes/meals from groundnut, peanut, linseed, sesame, cottonseed, rapeseed and mustard seed which are being exported to a variable extent. Thailand is perhaps, the only developing country in Asia where indigenous production of maize grain, cassava and fish meal far exceeds its domestic requirement.

Importation greatly affects the cost of feeds on the domestic market. The prices of locally produced feeds/feedstuffs are affected by the price of imported feed. Thus, millers and producers given the choice prefer to import feed ingredients, which require processing, for obvious reasons. e.g.

- 1) it is more expensive to produce/process feeds locally;
- 2) there is inadequate and unreliable supply of raw materials and
- 3) the quality of the products produced in a developing country is sometimes lower and more variable. The variability in quality of locally produced feeds is the major problem of producers and unavoidable.

Adulteration of feed with lower quality feed material is a common practice. Feed ingredients which are rejected on quality control grounds are often used by millers and producers without access to feed laboratories. Deterioration in feed quality during storage is also common. The hot-humid conditions during the wet season are conducive to fermentation, rancidity, mycotoxin production and/or perhaps growth of salmonella or contamination with the micro-organism. The high cost of drying aggravates the problems of storage.

Processing of raw materials varies from very efficient to primitive methods resulting in products which differ in colour, smell, taste and texture. In India for instance, a common practice is the deoiling of rice bran/polishing. Although the process increases the rice bran's protein content, it decreases its metabolizable energy and lowers the essential fatty acid content. India alone has 200 solvent extraction units and 70% of the de-oiled rice bran was exported upto 1978. Similarly, extraction of oil from oil seeds may differ between and within a country using either the more efficient solvent extraction method or a high or low pressure oil expeller or both. Depending on the process, residual oil increases ME but lowers the crude protein (CP) content and this leads to a short shelf life. Many protein meals that need cooking are sometimes under or overcooked. Locally processed fish meal is manufactured from a mixture of trash fishes and by-products of the canning industry resulting in a product of very variable composition.

Another major problem of the industry is compounding feeds from composition tables which have limited information or have been produced in other countries. Quite often the results of chemical analysis of the final product do not tally with the tabulated values from the ingredient. Information is usually not available on essential amino acids and fatty acids, metabolizable energy (ME) or trace elements.

Marked variations in the CP content of feeds may be accompanied by changes in amino acid content. To date there is no developing country which has established its own ME values for its feed ingredients.

Due to wide variability in components of feed ingredients, it is perhaps wise to make subclasses of some of these feeds based on well defined parameters. A typical example is rice bran. In the Philippines rice bran is classed as first class d1; second class d2 and third class d3 is mostly finely ground rice hull with little of the seed coat. This is usually used as carrier for premixes but is often used as a low cost adulterant. Rice d1 has a CP of 12.5% which differentiates it from d2 (CP 10%). However, our study showed that addition of up to 10% rice hull to d1 yields a CP value within the range of d1 (12.5% or higher). On the other hand its crude fibre (CF) content increased markedly, and perhaps CF is a more sensitive measure of rice hull adulteration than CP.

#### Quality control practices

The lack of quality control of animal feeds and poor financial support from the government have made it impossible to monitor feed particularly from the smaller feedmills, operators, feed ingredient manufacturers, and distributors, suppliers, dealers, retailers and importers. The chances of adulteration of feeds are high at any of the handling stages. Monitoring of feed quality is limited to proximate analysis which is mandatory in many developed countries. All Asian laboratories use proximate analysis (Association of Official Agricultural Chemist) (AOAC) and it normally takes a week for a complete analysis thus, only feeds with high purity will be analysed for proximate composition. To control the rampant adulteration practices rapid methods are reached but they are not available. The following analysis would be useful in feed quality control but have not generally been accepted:

- microscopic examination
- methionine and lysine levels in mixed feeds
- calcium and phosphorous levels in selected ration formulations
- salt analysis in local fish meal
- aflatoxin and other mycotoxin tests
- salmonella in animal protein sources
- vitamin activity in vitamin supplement
- trace minerals from pure sources
- antibiotic potency
- concentration of active ingredient in feed additives
- common toxic factor/metabolic inhibitor

Although some countries have quality control laboratories there is no real government imposed quality control and it is left mainly to the feed industry to monitor itself.

### Legislation

Not all Asian countries have an approved Animal Feed Law, although all countries agree that each must have its own feed law and that the government must provide financial support for its efficient implementation. Bangladesh has not enacted any law specific to animal feed nor has a programme to establish one. Like other industrial manufacturers, feed manufacturers are required to register their manufacturing, distribution and sale operations. The manufacturers may have their finished feeds analysed in order to get a "certification" from the Bangladesh Standards. Likewise, the adaption of Indian Standard Institute standards and mark of certification for finished feeds in India is not mandatory. In the absence of laws, mixed feed is manufactured, distributed and sold without quality control. The provisions of the Essential Commodities Act (1951) protect feed consumers to some extent.

In Pakistan, the proposed Punjab Animal Compound Feedstuff Act (1974) is now under study by the Department of Law and Finance. The Act is a comprehensive one patterned after the standard animal feedlaw of advanced countries but with some modifications for conditions existing in the Punjab. Other provinces have not proposed any similar law.

In Sri Lanka, the Ministry of Rural Industrial Development has made a draft of the Animal Feedstuffs Act which is presently under consideration. The Act would provide the creation of a Feedstuffs Advisory Committee which will formulate the minimum standards for quality of approved animal feeds. At present there are no statutory provisions to control the quality of feeds for sale.

Indonesia has several regulations governing the manufacture, sale and distribution of animal feed but none were officially sanctioned. The Philippines (1976), Thailand (1982), Singapore (1968) and Malaysia (1985) have officially sanctioned laws for quality control.

Essentially the laws contain more or less the same provisions, patterned on the developed countries. Government agencies have the power of entry and search of feedmills and many collect samples regularly for proximate analysis. The law requires guaranteed analysis of commercial mixed feeds on the following: moisture, crude protein, crude fat and crude fibre.

Except perhaps for Singapore, none of the Asian countries are presently capable of determining the purity, concentrations, activity and/or potency of feeds and imported products.

Singapore appears to have adequate laboratory facilities and its rules and regulations on importation, manufacture and marketing of feedstuffs appear to be implemented effectively. The livestock producers backed by large government field extension forces are well informed and are selective in their purchase of raw materials or finished feeds. Because of keen competition among the few licensed manufacturers, a high standard of internal quality control has to be maintained to keep their share of the market. However, Singapore encounters a high degree of variability in nutrient composition of imported feed ingredients.

#### Summary and Recommendations

There have been changes in livestock production methods and the poultry and pig industry in Asia has developed to include small farm holder operations and commercial scale large farms. The breeds/strains of animals have also changed in line with advanced countries. Although backyard pig and poultry operators are still in existence, these use breeds from the developed countries and are therefore dependent on commercial mixed feeds.

Some of the large feedmills are computerized. There is still, however, an unreliable supply of good quality feeds at a reasonable cost and a lack of adequate quality control services and of legislation or poor implementation of the law.

Although all countries are aware of the growing problems of both feed and livestock/poultry industries, very little is being done by governments and progress is slow. Although animal production is a general government priority, feed production is not given similar support.

Protein sources are in most critical supply followed only by energy sources. Bulk feeds are barely sufficient to meet demand unless priority to the local feed industry is given over exports. The problem of feed supply will remain unless governments take the initiative in the following: increase grain production; the use of low quality feed and animal breeds of lower potential and therefore maintenance energy requirements; stimulate the use of alternative feeds; improve feeding value of crop-residues and agro-industrial by-products. There appears to be opportunity for increased production through application of improved technologies and increased hectareage

planted to these raw materials either by opening new areas or replacing other crops of lower demands or over-production. There have been several researches on potential feed substitutes but still the major obstacle for adoption is the production on a commercial scale at prices competitive with the conventional feeds. Supplementary feeding with critical nutrients in association with methods of treatment have improved animal production from crop residues. However, this requires economic evaluation and appropriate technologies before recommendations can be made.

Under situations of inadequate feed supply, quality control becomes of paramount importance.

A quality control laboratory requires high initial investment and is expensive to maintain. Unfortunately, quality control measures in Asia are based on those of the developed countries even though the problems of feed quality are different from developed countries and therefore approaches to feed quality must also be modified. Since feed adulteration is common it can be detected immediately through the simple and inexpensive method "feed microscopy". Feed microscopy reduces the need for feed analysis. There are also other simple methods of analysis which can be established and which can be correlated with nutrients such as CP and CF. Likewise, there are several chemical tests that are based on simple colour developments.

A method which may work with one feed ingredient may not necessarily work for another feed ingredient. Likewise, the regression equation established between a colour test and the content of a nutrient must be specific for each feed ingredient. The objective in the Philippines is to provide small poultry and pig producers, with simple and inexpensive quality control kits, and educating the consumers to do their own monitoring of their feed may perhaps partially solve the problem of feed quality.

All the countries feel the necessity of an Animal Feed Law and its effective implementation. But the law can only be successfully implemented if the government can support the staff and material requirement of an efficient quality control laboratory and where materials are sold on the basis of these quality measurements.

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