

PRESENT SITUATION OF THE COMPOUND FEED INDUSTRY
IN CHINA AND PERSPECTIVES

by

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The continuous growth and comprehensive development of agriculture and livestock production in China are promoting the development of a feed industry.

The development of agricultural production is paving the way for the development of the feed industry by providing it with more raw materials. Animal feeding should be based on self-reliance and the exploitation of available feed resources is the basis for a feed industry. Grain production rose by 5 percent in 1984 to 407 million tons, sugar crops by 19 percent to 48 million tons. The main food grains for human consumption in China are rice and wheat. Therefore, maize, sorghum and the by-products of food processing, e.g. rice bran, wheat bran, distiller's and brewer's residues, the residues of bean curd, beet pulp and food grain offal, are the main feed ingredients. Oilseed meals are the main protein resources in China. The output of oil-bearing crops and soybeans came to about 12 million tons and 10 million tons respectively.

Increased straw production goes along with increased grain yields in China. Straw, the huge area of grassland, silage, green forages and sugar beet pulp are the main roughages for ruminants.

Straw has great potential for ruminant feeding and research work to increase straw digestibility is being done. Treatments with alkali, ammonia and urea are all being examined.

General situation of the compound feed industry in China

The compound feed industry is a new and developing industry. Output was 1 million tons in 1980 and this rose to 12 million tons in 1984. There are 93 factories of more than 10 thousand tons capacity and 2 500 factories of 2 - 10 thousand tons capacity. The total output of compound feed is only a small proportion of the total production of concentrates.

Excluding the large factories, the village industry plays an important role. The village industry produces about one-third of total compound feeds. For example, the agricultural departments of Guangdong Province supported 44 counties to set up 45 small factories each with a capacity of 1 000 tons in 1982 and extended this to a further 33 counties in 1983. 76 percent of chicken farms in Jiuquan

Area of Gansu Province used compound feeds which were produced by local factories.

The production of supplements, vitamins, premix, animal by-products, fishmeal, silkworm larvae and others are being developed simultaneously with this industry.

Freshwater fish-farming is an important business in China and a high yield per unit of water area can be achieved. Compound feed production is now developing to provide for fish and shrimp production.

The development of animal production and the feed industry also promoted the development of feed mill equipment manufacture. There was only one factory producing feed mill equipment before 1979. Now there are about 258.

General situation of research work for nutrient requirements of farm livestock

Feeding standards for livestock in China have been published.

As the calculation of energy requirements for milk production is complex in practice, Chinese dairy farms have always based feeding on milk yield. I suggested that an energy system should combine the scientific concept of metabolizable or net energy with feeding practice. In this system the energy value of feed and the requirements of dairy cattle are expressed in Dairy Cattle Energy Units, one unit being equivalent to the energy content of one kg FCM (about 730 Kcal).

$$\text{Dairy Cattle Energy Unit} = \frac{\text{Net energy content of feedstuffs}}{730}$$

The NEL content of a feedstuff is related to the energy concentration, i.e. DE/kgDM. The following relationship issued from our experiments,

$$\text{NEL(Mcal/kgDM)} = 0.7\text{DE(Mcal/kgDM)} - 0.4$$

The NEL requirement for maintenance of a dairy cow with still feeding is 70W 0.75, and plus 20 percent activity allowance, is deemed enough for a Chinese dairy farm.

Crude protein requirements for milk production have been obtained from nitrogen balance studies. These average 85g per kg FCM. A new system of protein evaluation based on the rumen degradable feed pattern is being studied and it may be finished by 1990. A proposal

for a new system of protein evaluation was published in 1985: (Feng Yang-Lian.)

We prefer the digestible energy system for the nutrient requirements of pigs. DE requirement for maintenance is $103W^{0.75}$, for growth, $3.5 \times$ maintenance (M) in 20-60 kg growth stage and $2.8 \times$ M in 60-90 kg growth phase.

The nitrogen deposition of 1 growing pig (g/d)

$$= 1.479 W^{0.75} - 0.266 W$$

The efficiency of feed nitrogen is 40 percent in 20-60 kg phase and 35% in 60-90 kg phase.

The ME system has been prepared for chickens. The amino acids, vitamins, minerals and trace elements required by pigs and chickens have been published in feeding standards.

These feeding standards are taken to be scientific instructions and are in widespread use in the compound feed industry and on farms. Feed efficiency appears to be increased by about 20 percent when these standards are used as compared with traditional feeding practices.

Perspectives

The development of a compound feed industry was rapid but compound feeds make up only a small part of total concentrates fed to livestock and it is therefore not sufficient to meet the demands of animal production. I estimate that with the same rapid growth rate in the next ten years, compound feeds may make up 40-50 percent by 1990 and 70-80 percent by 2 000 of the total concentrates fed and the system will be sufficient to meet the needs of the livestock industries.

As protein feeds are insufficient for animal production at present, the production of amino acids could rapidly become a growing industry. Methionine and lysine production is expected to reach 10 000 tons and 6 000 tons by 1990 and 30 000 and 20 000 tons by the year 2000. Premix may attain 0.3 million tons in 1990 and 0.9 million tons in the year 2000. The production of vitamins, trace minerals and other supplements will also rapidly develop.

The size and distribution of a feed factory should depend on the nature of production of feed resources, the systems of the peasant household and the cost of transportation. The small and medium sized feed factories are more suitable for the country.

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Table 1: Output of major agricultural products

	1984 (million tons)	change from 1983 (%)
Food grains	407	5.1
rice	178	5.5
wheat	88	7.7
soybeans	10	-0.7
cotton	6	31.1
Oil-bearing crops	12	12.3
peanut	5	21.8
rape seed	4	-2.2
sesame	0.5	33.9
Sugar crops	48	18.9
sugar cane	40	27.4
sugar beets	8	-9.8

Chinese statistical bureau, 1985.