OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

20083

PRESENT SITUATION AND DEVELOPMENT ASPECTS OF THE ANIMAL FEED INDUSTRY IN GHANA*

Prepared by

O. ONAYEMI
Association of African Universities
Accra, Ghana

December 1992

---

* Paper presented at the Regional Preparatory Meeting on Animal Feed and Related Industries in Africa, Bamako, Mali, 15-17 December 1992.

The opinions expressed in this paper are those of the author and do not necessarily represent the views of the Association of African Universities.

SUMMARY

The development of the animal feed industry is described in the context of land use pattern, current agricultural practices, available feed resources, and utilisation of crop residues. For ruminants which depend on forage, shrubs and trees, the use of agro-industrial by-products during the dry season will ensure that weight loss is minimised and the productive performance is improved.

Agricultural technology should be improved in order to increase the output of cereal and other crops and reduce the scarcity and high cost of these commodities for feed which threaten the pig and poultry enterprise in particular. Further research is necessary in order to define the limits of inclusion, toxicity, performance of animal on feed containing agro-industrial by-products.

To encourage the use of agro-industrial by-products in practical feeds, there is need to strengthen the extension services between the feed producers and the farmers. Credit incentive should be given by government to feed producers who use a stipulated minimum amount of agro-industrial by-products in their feeds.

Government policies on agricultural imputs, credit facilities, guaranteed prices need to be reviewed to encourage investment in agriculture and especially in feed production as an enterprise. In order to promote co-operation among countries within the region for industrial development, countries which have comparative advantage in some food ingredients should be encouraged to sell such products to one another.

1. STRUCTURE OF THE ANIMAL FEED PRODUCTION INDUSTRY IN GHANA

The livestock feed industry in Ghana are of two categories depending on the animal types.

a. those which depend on natural grasslands (ruminant species) especially during the rainy season and require feed supplement during the dry season, (b) those which depend on crop and other products e.g. monogastric animals (poultry and pigs)

In either case, the feed industry relies on small livestock owners who keep a few herds of cattle or goats and sheep on their

farms, while the poultry farmers rely on commercial feeds prepared by the farmers or companies from maize fish meal either for use on their farms or at small industrial locations where they are used for their animals or sold to the livestock farmers in their locality and beyond.
Table 1 & 2 shows the livestock population in Ghana for the period 1987 - 1990.

Despite the modest increase in the livestock population in Ghana, there has been only a 10 percent increase in the meat supply from domestic sources. Table 3 & 4 shows that both cattle and poultry (each contributing one third of the total meat supply) contribute the bulk of the meat supply to the animal protein intake. The supply of protein from cattle or poultry sources is generally expensive and is mainly attributed to the problem of feed availability, water supply, availability of improved breeding stock, disease control, high lending policies to the livestock sub-sector.

Feed takes between 60-85% in the cost of producing poultry and pigs. Factors which will promote the use of agricultural industrial by-products in feed formulationin order to develop the livestock industry is the focus of the paper.

RUMINANTS - CATTLE, GOATS, SHEEP.

It is generally believed that ruminants only require pasture for sustainance and development and an unlimited supply of natural grassland exist in the free range which also include herbs and shrubs. The major problem of ruminant is to provide them with feed and water during the dry season. It is during the dry season that weight loss (up to 30% liveweight) and poor reproductive performance occur. Table 4 shows the land use pattern in Ghana. It could be seen that the permanent pasture land has been decreasing at the expense of farming and other uses which suggests that feed resource use could be increased only through crop production. Local pasture (grass) is low in total digestible crude protein and high in fibre. It is over grazed because of over stocking and the communal ownership of the grassland.

The grazing animal does not harvest more than 50% of the potentially harbaceous biomass nor does forage resources from trees and shrubs form more than 20% of the normal feed of the grazing animals. The large herd owners allow the pasture to be overgrazed and soil degradation occurs. In the humid forest and derived savana zone where grazing is available year round, the threat of trypanosomiasis has limited cattle production and enchanced small ruminant production. Large animals are restrained because they might destroy arable crops, thus they are fed with housenold scrap consequent on goats and sheep grazing around urban areas in order to feed on the urban grass and shrubs around the homes.

During the rainy season, the dry matter content of the

forage is almost 80% and this decreases to 20% during the dry season. It is during the dry season that many cattle farmers resort to the use of crop residues.

Crop production statistics of Ghana is shown in Table 5 and crop residues have been estimated from these values based on factors obtained by considering the yield of potential food available from these crops during processing. Table 6 shows the potential feed resource production from the grassland and crop residues. The table indicates that for Ghana, the crop-residues could give about 61% of the dry matter, 65% of the total digestigle nutrient and 70% of the digestible crude protein to the animal feed requirement.

Crop residues are however of different types and characteristics and are obtained from crop processing operations. Quantitatively they consist of the small households to the industrial agricultural by-products from operators. In general, they are of low value in monetary terms and in nutrient content and often represent waste to the layman. In some cases, they are often high in moisture, and usually require further processing in order to utilise them in feed formulation. But to their credit and utility they are high in nutrient and readily digestible.

Much success has been recorded in supplementing livestock feed with agricultural by-products in order to maintain the live weight of the animal and productive performance. They include cocoa pod husk, banana and plantain leaves, cassava peels, rice straw, cereal offals, sugarcane molesses, pineapple peels etc.

In many parts of Ghana, rice straw treated with urea is widely used as supplement for ruminants during the dry season. Other cereal by-product residues need further treatment or reducing their sizes before they are fed to ruminants or incorporated as supplement. It has been shown that modifying cereal straw by treating it with caustic soda or urea could serve as supplementary feed to ruminant. The problem is that the technology of their modification or treatment has not been widely transfered or adopted by the livestock farmers.

The livestock population is increasing at an average rate of 4.18 percent which means that natural grazing cannot continue since all cultivable land will be required to produce human food. It is now known that permanent pasture lands have been decreasing at the expense of farming and other uses. An indication that it might be possible to increase feed resources through increased crop production in the short-term, the residue of which will be used as feed supplement. The current agricultural production technology suggests that crop output cannot keep pace with population growth let alone leave a surplus for livestock feed. What has been recommended is that improved pasture consisting of legumes and grass be established and managed for higher carrying capacity while crop residues could be used as supplementary feed during the dry season.

MONOGASTRIC ANIMALS: POULTRY AND PIGS

Although Ghana has always been a crop producing nation, with fishing and hunting as associated business, a large number of people are engaged in commercial poultry and piggery business; and more than 50% of the animal protein demand of the population is derived from locally raised poultry. The minimum recommended levels of intake of protein are not met by many Ghanaians because high feed costs have led to irregular supply of almost all animal protein products. Feed takes between 60-85% of the variable cost of producing poultry and pigs in Ghana. The main reason is the inadequate production or scarcity of the major basic feed ingredients, notably maize and fish meal. The competition for these ingredients by man is also responsible for their scarcity for use in livestock feed.

The main feed ingredients are not available locally in reasonable quantity and have to be imported from other countries. Maize for instance had to be imported almost every year since local production cannot keep up with the demand. Much effort and research have been directed at replacing the main feed ingredients in order to reduce the cost of feed using a number of crops or their by-products. Some degree of success has been reported but there is a limit to which the substitution could be made without affecting the quality and performance of the animal either for meat or egg production. The use of alternative and cheaper sources of protein and energy in feeding farm animals has become a vital point of interest for the growth of the local livestock industry.

Table 5 shows the production of selected foodcrops (000MT).

Table 5: Production of selected Foodcrops ('000MT).

Crop	1987	1988	1989	1990
Cassava	2728	2300	3320	2717
Yam	1185	1200	1280	877
Plantain	1078	1200	1040	799
Cocoyam	1012	1115	1200	815
Maize	598	600	715	553
Sorghum	206	178	215	136
Groundnut	191	230	200	113
Millet	173	192	0.80	75
Rice/Paddy	81	105	67	81
Pineapple	8	9	10	10

SOURCE: Ministry of Agriculture: The quantity of by-products generated can be calculated using the fact that root

crops in general yield 40% waste, while rice paddy yields 50% waste and for sorghum, maize, millet the by-product is generated of the order of 30 percent.

While the protein source in poultry feed can be replaced by vegetable protein, there is no cheap substitute for maize. Cassava is very expensive to produce under the present farming conditions in Ghana although it is a feed ingredient in other parts of the world. There is a possibility that in future cassava might be used in livestock feed if new improved varieties are planted and the necessary imputs supplied so that the maximum yield can be obtained and considered as feed crop in its own right.

Agro-industrial by-products by their nature when properly processed and incorporated as replacement or supplement in conventional feed formular are highly digestible, will reduce cost, and thereby stimulate development in the livestock sector.

However, extension services need to be strengthened and research should be undertaken to solve the problem relating to:

- further processing and cost of using agro-industrial products.
- storage characteristics eg. development of rancidity in high fat ingredients, eg. groundnut cake, soybean cake.

ECONOMIC FACTORS WHICH INFLUENCE THE ANIMAL FEED PRODUCTION AND UTILIZATION SECTOR

Because of the need to maintain the performance of imported and local cattle especially during the dry-season and with the advent of modern intensive rearing of poultry and pigs to meet the demand of the population for eggs and meat, livestock feed production on a commercial scale has become an important economic activity of livestock production in recent times. Birds which were imported needed constant and good quality feed and profit consideration by feed millers aside, the commercial feed production was part of the package imported to improve meat supply by importation of exotic birds. Another interest was the need to utilise the by-products from flour milling operation and breweries. The Ghana Food Distribution Complex at Tema had an initial program of utilizing the wheat offals at its inception about 30 years ago.

There are few reports on the use of agro-industrial by-products in practical livestock feeds in Ghana partly due to lack of appreciation of their nutritional importance and the reluctance of the farmers to use them. The small quantities of the agricultural by-products that are available are scattered over a wide area and it requires investment in transportation, technology and further processing to incorporate them into

practical feed. There is also the need to market the feed containing the by-products. But perhaps more importantly is that conventional feed resources are becoming scarce, production is uncertain and the prices are high. At present, certain economic considerations underly the development of the feed production industry in Ghana. These are:

1. The need to contribute to the agricultural sector through animal husbandry,

2. The need to supply feed to the imported poultry for which there had been a considerable investment.

3. and the need to reduce the cost of feed in order to optimise the use of major feed ingredient required for local foods. The need to contribute to development activity and supply of feed to animals and maximising the use of crop resources are some of the factors which influence animal feed production.

   The low cost of feed will be translated into lower cost of animal protein and promote better health.

4. Another objective is to utilise the by-products which could have been disposed off as a waste without any monetary value. As stated earlier, agro-industrial by-products such as groundnut cake, SBM, PKM, when properly treated, and incorporated at a level which does not adversely affect the efficiency or performance of the animal, could contribute to the animal product (meat, egg, milk) of the population.

5. Although some further processing of the agro-industrial by-product may be necessary prior to its use, the cost recovered will not only benefit the animal feed producer but it will reduce the cost of desposing the by-products.

It will be realised that farmers at the home-level have raised pigs and poultry on by-products of food processing operations. The animals thus contribute to the value of the crop and when the animals are sold, provide some income to their owners.

ACTIONS TO BE TAKEN TO UTILIZE AGRO-INDUSTRIAL BY-PRODUCTS AND RESIDUES FOR PRODUCTION OF ANIMAL FEED

In order to utilise agro-industrial by-products for the production of animal feed, two lines of approach are suggested:

(a) incorporate the by-product into conventional maize based diet as replacement.

(b) develop new feeding system based entirely on the use of the agro-industrial by-products.

It must be realised that the first proposition is easy to achieve and is highly recommended. To adopt this method for practical feeding, there is need to screen the locally available feedstuff for their chemical composition, level of incorporation, toxicity and effect on production performance on the stock.

The main organisational problems limiting the use of agro-industrial by-products are related to:

(1) lack of tansport facilities to collect the by-products from the samll holder crop-processors to a central location where they could be reprocessed by drying to reduce the bulk and size reduction to incorporate them into regular feed or modify the by-product where necessary.

(2) lack of an organised marketing system whereby the by-products are traded like the main crop. e.g. cocoa pod husk is seen as a waste with no real value if company is interested in re-processing the cocoa pod husk and selling it to feed millers there will be a greater revenue to the cocoa farmers generated by the sale of the cocoa pod husk in addition to the revenue from the cocoa beans.

FINANCIAL ACTION

The agro-industrial by-products, are generally bulky and low in nutritive value and are usually considered as industrial pollutants by food processors. For example, because of lack of demand for the sugar barsass produced by a distillery company, this product is burnt by the factory . It is possible to device a system of reward to industrial processors who are able to market the by-products after investing in re-precessing plants in order to ensure that such by-products are utilised in feed production. Here, additional investment is required.

The revenue derived from the sale of the agro-industrial by-product represents an insignificant source of income to the crop producer or processors, but the amount could be used to offset the cost of disposing the waste.

In order to promote the use of agro-industrial by-products, government could give a credit scheme to industrial feed millers who use a certain minimum percentage of the locally produced by-products in their formular. With this method, there will be a deliberate effort to consider the by-product as a feed resource and reduce the pressure on the main food crop.

EXISTING AGRICULTURAL RAW MATERIALS IN GHANA WHICH ARE POTENTIAL SOURCES FOR THE PRODUCTION OF ANIMAL FEED

Almost all the conventional agricultural raw materials like cereal, cassava or the by-products of wheat brans, rice husk, cassava peel plantain peel, brewers spent grain sugar mollases, could be used for production of animal feed. Table 5.

The main limitation for the use of the main crop is the competition by human for use of the same crop as food and the prohibitive cost of production under the present agricultural technology and practice. It costs three times to produce the same quantity of cassava than maize and the economics of production is not in favour of using conventional food crops for livestock feed as for their by-products.

The quantities of these crop products such as maize and cassava are hardly enough to satisfy the human needs under the present farming system let alone use them in production of feed. It is only in the forseable future when the agricultural technology and farming systems improve that the conventional feed will be used in feed production.

The crop residues (or agro-industrial by-products) on the other hand will be relied upon as an important feed resource in not too distant a date in Ghana. What is required is extension to determine the value and level of incorporation after they have been treated.

It has been demonstrated that the fishmeal which is a protein source in typical poultry feed could be replaced by vegetable protein. A list of the potentially available proteins available in Ghana (Table 8) indicates that research is needed to determine the acceptable level of substitution of the vegetable protein, toxicity factors and their storage characteristics and the processing techniques to be adopted in optimising their use in production of animal feed.

Table 8. Some Potential NCF's available in Ghana

NCF	Why used	Upper limit of inclusion (%)	Reason
Soybean meal	Protein; energy	20 - 30	Soyin Fat
Groundnut cake	protein; energy	20	Fat Rancidity
Copra cake	Protein	10	Poor palatability
Palm Kernel cake	Protein		low palatability
Cotton cake	Protein	5	Coloring effect
Rice bran	Dilution Protein	10	Fibre, Fat
Maize bran	Energy?	10 - 15	Fibre, Moisture
Wheat bran	protein	25	Fibre
spent grain	Energy, protein	15	Fibre
Pito mash	Protein	10	Fibre, Tannins?
Oil palm slurry	Energy	10	Rancidity
Cocoa pod husk	Dilution, cost	10	Fibre
Cassava peel meal	Dilution cost	10 - 15	Fibre, Low Protein fibre
Coffee pulp hull	Dilution, cost	2.5	Fibre
Cassava	Energy	20 - 50	Low protein, Dustiness
Sorghum	Energy, Protein	60	Tannis
Millet	Energy	20	
Cassava leave meal	Protein, Pigment	15	Fibre, Tannis
Bauhinia leaf meal	Pigment, protein	2.5	Low palatability tannis,nitrates
Gliricidia leaf meal	Pigment, protein	2.5	- do -
Leucena leaf meal	Pigment, protein	5	Mimosine,
Grass meal	Pigment	5	Fibre

Rubber seed meal	Energy	20 - 40	antifertility Amino acid def.

Source: S.A. Osei (1991) UST. Dept. of Animal Science. Ghana

ROLE OF SMALL AND MEDIUM SCALE ENTERPRISE IN THE ANIMAL FEED PRODUCTION SECTOR

The distinction between the small and medium scale enterprise is based on the scale of feed production, capital investment, number of employees and organisational set up in terms of marketing outlet or network and quality assuarance. The animal feed production sector is dominated by small scale operators characterised by small livestock owners who have either a few herds up to 100 maximum of cattle and or goats and sheep or poultry and pigs. In the Upper East, West and derived Savana Zone in the Southern parts of Ghana cattle, sheep or goats are kept for cash income, prestige and payment of dowry and are allowed to graze on the local pasture shrubs or browse and fed on kitchen wastes or scraps from crop residues during the off-season. It is only in recent times that the cattle are fed on urea treated rice straw as supplement in order to maintain their body weight during the dry season.

The small scale poultry and pig enterprise occassionally prepare their own feed when they can afford the investment in purchasing milling machines and ingredients in order to prepare the feed for their livestock production of up to 1000 metric tons/year is not uncommon. Because of the technical difficulties which the samll operators encounter especially, when the machines break down or the feed ingredient becomes prohibitively expensive, small enterprises resort to buying their feed from the medium enterprise feed operators.

The medium scale animal feed enterprises are of two types:

(1) Those which are owned either by Ghana nationals in partnership with foreign partners or those which are owned exclusively by Ghana nationals. In usual cases, they keep poultry or pigs and produce enough feed to meet their needs and sell the surplus to a few clients who purchase their drugs or birds from their hatchery. The other class of madium scale feed producers are able to sustain a 15.6% growth (in 1991) to keep pace with growth of poultry in spite of the enormous constraints under which they operate. Government assistance is necessary in order to enable these enterprises contribute to the industrial development of Ghana in the food production sector.

LOCAL MANUFACTURE OF THE ANIMAL FEED PRODUCTION EQUIPMENT AND IMPORT REQUIREMENT

The small and medium scale animal feed production sector relies on small scale equipments which are simple to operate and fabricate their replacement. Local plate mill, which are powered by simple electrical motors are quite common especially among the small scale feed producers. Ther medium scale feed producers have adequately staffed technicians who are able to carry out routine maintenance of their equipment and machinery and assure continuous production when the feed ingredients are available.

There is also a large pool of artisan and small foundry in the township where the enterprises are located where replacement parts can be improvised. Very few machine items are imported from the original suppliers of the equipment, thus ensuring that there is continuous production.

PRESENT CONSTRAINTS AFFECTING THE ANIMAL FEED INDUSTRY IN GHANA

As stated earlier, the animal feed industry in Ghana is not expanding to meet the demand both on a short-term-long-term projections of livestock production and enterpreneurship development. The growth of the feed industry is constrained by the following:

1. Crop production especially food crop is not growing at a rate that would leave enough surplus for the livestock feed sector due to inadequate use of imputs and adoption of inappropriate farming technology. Government should provide the necessary incentive which will encourage increased activity in the farming sector. These incentives include credit to farmers, providing insurance scheme, providing imputs - fertilizers, land clearing incentives using tractors etc. Because of the low output of the major ingredients, feed producers resort to importation and operate low capacity utilization of their equipment and capital outlay. The current rate of borrowing money for agricultural ventures (23-24%) is a disincentive to prospective investment because of the risky nature of agricultural enterprise.

2. Commercial grazing areas with improved pasture consisting of grass/legume mixture should be established in those areas where cattle are currently grazing uncontrolled.

3. Extension services which will bring the problems of the farmer to the researcher should be strengthened and equipped with qualified staff. These extension workers will also train and educate feed producers on the

value of agro-industrial by-products and the level to substitute in their formula.

4. Most animal feed producers stated that the government's monetary policy, especially on credit is a disincentive o borrowing for expansion and even operation. It is recommended that this aspect be reviewed s that feed producers could buy and store maize and fishmeal thereby helping the farmers of these commodities.

5. The government liberalization policy has encouraged the importation of food and feed ingredients thus making local production uncompetitive with the cheap imported ones. The poultry industry and the beef market have suffered in this way and those who invested in these sectors are finding it difficult to survive. It is suggested that government policies should be consistent in order to protect local investors who are contributing to development.

6. There is concern that besides the high price, the quality of the fishmeal locally produced is poor often containing higher level of sand than is desired for good ration. It is suggested that the feed millers should undertake to educate the fishermen on the technology of catching and drying fish so that they would produce according to their specification.

7. Research is needed to determine which of the feed ingredients could be replaced by local ingredients or agro-industrial by-products. Support should be provided to researchers to carry out investigations rather than rely on importation of those ingredients which could be sourced locally. Infrustructural facilities should also be set up by the feed producers to test the quality of the product formulated with local ingredients or those purchased on the open market. This will enable both the producer and user of the feed establish mutual confidence between themselves.

ANIMAL FEED MARKET IN GHANA

It was suggested that commercial ranching with improved pasture be set up so that cattle stocking rate and grazing intensity can be controlled and soil degradation controlled. For the dry season feeding, greater emphasis will be placed on agro-industrial by-products under the feedlot system. Since free grazing area is becoming limited, it is proposed that industrial grazing coupled with greater use of well treated crop residue will minimise the effect of nutritional problems on livestock production in Ghana.

There is need to develop a feed production sector as an industrial activity if the agricultural system that ensures improved crop out is put in place. Incentives should be given to enable medium feed producers to operate at higher capacity than is currently done. Small feed operators should be given franchise to produce under specified conditions so that the quality of the poultry feed is guaranteed. There are well known brand names on the market with their organizational set-up, and facilities for investment thus a better scale of operation is envisaged.

PROPOSALS AND MEASURES TO STRENGTHEN REGIONAL CO-OPERATION AT ALL LEVELS.

1. The high cost of feed ingredients is one of the main constraints of livestock enterprise in Ghana. Because of the low production of maize and seasonal nature of fishmeal and other premises, the producers had to import these ingredients from South America and U.S.A. There are some countries in west Africa which can supply these ingredients at reasonably low prices comparable to what is paid for by importing these abroad.

   Fishmeal could be imported from Senegal while yellow maize could be imported from South Africa if the production could not be increased substantially in the short-run. Improved high yielding varities of cassava have been released by International Institute of Tropical Agriculture, Ibadan. It is now possible to obtain a yield of 29 tons/ha rather than 7.9 tons/ha which is currently in production. By planting the new cassava varities with the correct imputs, it is possible to increase the yield of cassava and have enough for the feed sector. It is possible to have dreid cassava chip imported from neigbouring West African countries for this purpose since it might not be possible to open up new land for cultivating cassava and in any event it might be unprofitable to do so due to land use limitation.

2. As a way of promoting inter-regional co-operation, it might be profitable to sell cattle from one country to be fattened in another country where industrial cattle ranch is established. The economic factors clearly overweigh the sentimental or cultural issues.

3. The technology of agro-industrial by-product utilization should be evaluated, promoted and disseminated to industrial enterprise in the region.

4. Regional laboratories for analysis of quality of commercial feed should be set up by either government or feed producers and animal nutritionists should be encouraged to move across borders in order to exchange knowledge and

ideas about feed formulation etc.

5. Governments in the region should review their policies on enterprise development and provide conducive enviroment that should encourage investment in the feed sector through tarrif, tax incentives and legal instruments.

6. Where one or more feed producer has comparative advantage on the economics of feed production, appropriate incentives should be provided to enable the company set up in another country or operate under a franchise in the country. This will promote and facilitate trade, industrial development and ensure regional co-operation.

Table 1. Livestock Population ('000) in Ghana.

Type of Livestock	1987	1988	1989	1990
Poultry	8,214	8,040	8,738	9,686
Sheep	1,989	2,046	2,212	2,555
Goats	1,901	1,991	2,363	2,834
Cattle	1,170	1,145	1,136	1,158
Pigs	398	478	559	677

Source: Agriculture in Ghana: Facts and Figures issued by PPME Ministry of Agric, Accra, November, 1991.

Table 2. Index of Livestock Population (1984 - 1986 = 100)

Type of Livestock	1987	1988	1989	1990
Poultry	110	108	117	130
Sheep	103	106	115	133
Goats	116	121	116	173
Cattle	109	107	106	108
Pigs	93	111	130	157

Source: Agriculture in Ghana: Facts and Figures issued by PPME, Ministry of Agric, Accra, November, 1991.

Table 3. Meat Production

Type of Livestock	Estimated Meat Production (Tonnes)			
	1985	1987	1989	1990
Cattle	14,254	15,661	18,000	19,800
Sheep	8,943	8,948	8,580	8,580
Pig	8,262	7,979	5,040	5,544
Poultry	8,020	6,571	3,200	3,520
Goat	6,020	7,128	8,580	8,580
Total	45,499	46,287	43,400	46,024

Table 4. Index of Meat Production (1985 = 100)

Type of Livestock	1987	1988	1989	1990
Cattle	109	107	106	108
Sheep	103	106	115	133
Pigs	93	111	130	157
Poultry	110	108	117	130
Goats	116	121	116	173

Table 5. Yield of Selected Foodcrops: Average For (1987-1990)

Crop	Yield (Mt/Ha)	Achievable Yield (Mt/Ha)*
Cassava	7.8	28.0
Plantain	7.1	10.0
Yam	6.1	10.0
Cocoyam	5.6	8.0
Groundnut	1.4	2.0
Maize	1.2	5.0
Rice	1.0	3.0
Cowpeas	0.9	2.0
Millet	0.7	2.0
sorghum	0.7	2.5

* Indicate yields that have been achieved in isolated cases due to more effective extension and other logistic support.

Table 7. Estimated Levels of Per Capita Consumption of Selected Food Crops.

Commodity	kg/ Head/ Year 1980	1985	1990
1. Roots and Tubers			
Cassava,	145.2	146.3	148.0
Yam,	44.2	43.8	43.3
Cocoyam	-	-	54.0
2. Plantain	62.2	82.5	83.0
3. Cereals	84.8	85.4	88.2
Maize	38.4	39.2	40.3
Rice	12.4	12.0	13.3
Millet	17.0	17.1	17.3
Sorghum	17.0	17.1	17.3
4. Pulses and Nuts	22.4	22.5	22.6
Groundnuts	21.5	21.6	21.7
Cowpeas	0.9	0.9	0.9

Table 7. Amount of Feed Resources From Natural Grassland and Crop Residues that Are Potentially Consumable.

Nutrient Characteristics	Sources	1970	1975	1980	1985	% Contribution in the average Total
Dry Matter 10^6mt	Grass	3.75	3.70	3.65	3.60	33.64
	Browse/ Shrubs	0.64	0.63	0.62	0.61	5.76
	Crop Residues	7.01	6.06	6.66	6.77	60.60
	Total	11.40	10.39	10.93	10.98	100.00
Total Digestible Nutrients 10^6mt	Grass	1.90	1.87	1.85	1.82	30.39
	Browse/ Shrubs	0.40	0.39	0.38	0.38	6.37
	Crop Residues	4.06	3.54	3.92	3.95	63.24
	Total	6.36	5.80	6.15	6.15	100.00
Digestible Crude Protein 10^6mt	Grass	64.13	63.27	62.42	61.56	16.01
	Browse/ Shrubs	52.33	51.66	50.84	50.18	13.06
	Crop Residues	270.46	261.82	307.30	273.80	70.93
	Total	386.91	376.75	420.56	385.54	100.00

Source: J. E. Fleischer (1992) Dept. of Animal Science, University of Ghana, Legon.

Table 6: Feed resource production from the natural grassland and crop residues.

Nutrient Characteristics	Sources	1970	1975	1980	1985	% Contribution in the average Total
Dry Matter 10^6mt	Grass	7.50	7.40	7.30	7.20	43.30
	Browse/ Shrubs	3.19	3.15	3.10	3.06	17.67
	Crop Residues	7.01	6.06	6.66	6.77	39.03
	Total	17.70	16.11	17.06	17.03	100.00
Total Digestible Nutrients 10^6mt	Grass	3.80	3.75	3.70	3.65	39.12
	Browse/ Shrubs	1.97	1.95	1.91	1.89	20.16
	Crop Residues	4.06	3.54	3.92	3.95	40.62
	Total	9.83	9.24	9.53	9.49	100.00
Digestible Crude Protein 10^6mt	Grass	128.25	126.54	124.83	123.12	19.27
	Browse/ Shrubs	261.58	258.30	254.20	250.92	38.05
	Crop Residues	270.46	261.82	307.30	273.80	42.68
	Total	644.50	635.86	681.34	647.84	100.00

Source: J.E. Fleischer. Dept. of Animal Science, Univ. of Ghana.

Table 4: Land Use Pattern in Ghana

Land Use Characteri -stics	1971	10^3ha ~~ha~~	1986	%Change
Total Area	23854		23854	-
Land Area	23002		23002	-
Water Bodies	852		852	-
Permanent Cropland	1600		1720	7.50
Arable Lands	1000		1140	14.00
Forest and Woodland	9400		8350	-11.11
Permanent Pastures	3560		3410	- 4.21
Other Lands	7442		8382	12.63

Source: F.A.O. (1988) Food and Agriculture Organization Production Yearbook.

A B S T R A C T

PRESENT SITUATION AND DEVELOPMENT ASPECTS OF THE ANIMAL FEED INDUSTRY IN GHANA

by

O. Onayemi
Association of African Universities
Accra, Ghana

The development of the animal feed industry is described in the context of land use pattern, current agricultural practices, available feed resources, and utilisation of crop residues. For ruminants which depend on forage, shrubs and trees, the use of agro-industrial by-products during the dry season will ensure that weight loss is minimised and the productive performance is improved.

Agricultural technology should be improved in order to increase the output of cereal and other crops and reduce the scarcity and high cost of these commodities for feed which threaten the pig and poultry enterprise in particular. Further research is necessary in order to define the limits of inclusion, toxicity, performance of animal on feed containing agro-industrial by-products.

To encourage the use of agro-industrial by-products in practical feeds, there is need to strengthen the extension services between the feed producers and the farmers. Credit incentive should be given by government to feed producers who use a stipulated minimum amount of agro-industrial by-products in their feeds.

Government policies on agricultural imputs, credit facilities, guaranteed prices need to be reviewed to encourage investment in agriculture and especially in feed production as an enterprise. In order to promote co-operation among countries within the region for industrial development, countries which have comparative advantage in some food ingredients should be encouraged to sell such products to one another.