

THE AVAILABILITY AND UTILIZATION OF ANIMAL
BY-PRODUCTS IN GHANA

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ANIMAL BY-PRODUCTS' UTILIZATION FOR
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SUMMARY

This paper attempts to identify animal-based raw material resources from slaughter houses, the fishery and poultry industries, their estimation, utilization and finally the disposal of wastes from such processes.

It became evident that quite huge quantities of animal-based by-products go to waste or are inefficiently utilized in the country. This also contributed to blemishing of the environment, loss in foreign exchange through such material resource going to waste and above all poor management and development of human skills to exploit the fuller utilization of such resources.

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1. INTRODUCTION

Ghana, a West African coastal country, English speaking and with a population of about 12million, is situated between two West African French speaking countries, Togo to the east and Côte d'Ivoire to the west.

Animal by-products that occur in the country are derived from slaughter house wastes. They comprise of horns, hooves, blood, hair, hide, bones, soft internal tissues, etc. Even though some of these by-products are utilized as food (such as hide and most soft internal tissues), the inedible wastes (i.e. horns, hooves, blood etc.) are inefficiently disposed of and contribute to pollution of the environment.

The need to enhance environmental management has been very well highlighted in this country especially with the case of toxic waste dumpings. The presence of these slaughter house wastes, therefore, present a challenge to Ghanaians to prevent factors that contribute to blemishing of the environment and also the need to maximize utilization of such material resource as far as possible for the benefit of humans and our animals alike.

This paper attempts to estimate the availability and quantity of such material resource in Ghana in the light of exploring promotion of their increased utilization, to conserve environmental quality and to improve human resource skills and exploit animal by-product utilization for the generation of useful products for human and animal utility.

2. LIVESTOCK/SLAUGHTER CENSUS OF GHANA

It must be emphasized that there is difficulty in obtaining accurate estimates for livestock and slaughter census in the country. This may be due to the rapid changes in some areas with some types of stock (eg. poultry), the varied nature of raising animals in the country and also due to rampant unauthorised slaughtering that occur throughout the country. It is also interesting to note that the livestock population available does not represent the slaughter stock available, because some stock owners prefer to keep their stock as a course of capital (i.e. wealth), rather than stock breeding for slaughter.

TABLE 1 GRAND NATIONAL TOTALS FOR
LIVESTOCK POPULATION (In thousands)

Source : Animal Health and Production Department
Ministry of Agriculture
Accra

Year	Cattle	Sheep	Goats	Pigs	Poultry	Rabbits
1987	1,169	1,988	1,900	398	8,241	82
* 1988	-	-	-	-	-	-

* 1988 livestock population census was not complete at the time of compiling this data.

TABLE 2 ANNUAL TOTAL SLAUGHTER (licenced)
OF LIVESTOCK (In thousands)

Source : (As for Table 1)

Year	Cattle	Goats	Sheep	Pigs	Dogs
1987	71	65	51	13	0353
1988*	-	-	-	-	-

TABLE 3 REGIONAL ANNUAL SLAUGHTER FIGURES (1989)

Source : (As for Table 1.)

Region	Cattle	Sheep	Goats	Pigs	Dogs
Greater Accra	30,216	8,821	5,389	423	-
Ashanti	30,872	4,452	5,513	1,050	-
Brong Ahafo	-	-	-	-	-
Volta	3,126	4,206	6,312	601	-
Eastern	1,959	4,300	4,437	467	-
Central	422	2,781	3,549	440	-
Western	2,865	7,072	8,187	1,102	-
Upper East	-	-	-	-	-
Upper West	4,189	1,857	4,641	4,755	248
Northern	11,046	7,289	15,581	2,415	112

Livestock population census (Table 1), indicates that there are more poultry, sheep and goats than there are cattle in the country. In recent years, the raising of small stock (including rabbits) have been encouraged in the country.

Annual total and regional slaughter figures (Tables 2 and 3 respectively), only indicate recorded licenced slaughter of stock in the country. There are about 12 licenced premises of slaughter house equivalent spread over the regional capitals in the country. In addition there are over 25 smaller premises equivalent to a slaughter slab also spread over the regions in the country, but these premises are mainly located in small towns.

It is clearly understood that rampant clandestine (or unauthorised) slaughter of stock occur throughout the country. Even though this practice is illegal and dangerous, because the animals concerned evade antemortem as well as postmortem inspection of the meat, it has not been possible for the authorities concerned to clamp down on this practice. In reality then, many more animals are slaughtered annually and also on daily basis than has been estimated in Tables 2 and 3.

It is estimated that clandestine slaughter of stock may run between 5 to 10% of the total number of animals slaughtered, in the cities and perhaps greater than 10% in town, villages and in the bush.

2.1 Meat slaughter, charges and handling

In one Government slaughter house, handling cattle slaughter alone, about 10 or more animals are slaughtered per day. Animals are tied down (both hind and fore legs), and slaughtered on the floor mainly by Muslims. The slaughter houses are, therefore, the Booth type and considerable contamination of the carcass may occur at the end of the dressing process.

A minimum fee of about ₵1,000 (one thousand cedis) equivalent to US\$3.13 at ₵320 to a Dollar may be collected as slaughtering and dressing charges. When private slaughter men are hired to carry out slaughtering and dressing, the charges may be higher and it is customary for slaughter men to keep as gratis certain part of the carcass (ie. some soft internal tissues, parts of the neck etc.).

There are usually about 10 Government workers in this slaughter house engaged in slaughtering, dressing and cleaning activities. They receive an average of about ₵4,400 (four thousand four hundred cedis) per month, equivalent to US\$13.8 at an exchange rate of ₵320 to the Dollar. Meat inspectors who come in to inspect animals and carcasses receive 20 gallons (90 litres) of petrol allowance per month (when with means of transport) or ₵100 (one hundred cedis) equivalent to US\$0.3 at the above exchange rate, per day without means of transport. This situation may however be different from place to place.

Meat from the slaughter house does not normally go through the usual holding period in the chill to allow for postmortem glycolysis and rigor mortis processes to occur and resolve itself. The meat is distributed straight away to small butcher shops for sale as bone-in or boneless portions, and not by conventional meat cuts. Most of the butcher shops do not have any cold storage facilities so carcasses are normally hanged by hooks in the shop throughout the whole day. Unsold meat is normally kept frozen at the end of the day in rented cold stores.

No inedible waste normally occur on the meat markets except for some few scraps of bone and flesh on the floor. These are normally swept and thrown away. Bones from trimmed meat are usually chopped into smaller parts and sold for food.

In extreme cases of long power failures especially in big meat shops, frozen meat may thaw out and decompose. Disposal of such meats may be certified by the appropriate government agency.

3. MODE OF RAISING LIVESTOCK IN GHANA

3.1 Cattle

Cattle are normally raised in Ghana by herdsmen in a sedentary way, that is, the herd is located in one area and movements are mainly for grazing purposes: At the end of the day the herd is returned to their kraal. Here, they are protected against thieves and sheltered from rain and storms.

No forage cultivation is done in the country. Animals normally graze on the natural pasture which is lush and succulent during the rainy season, therefore encouraging live weight gains of the animals. During the dry season, the pasture is dry and very little forage is available. Animals walk for long distances to graze on the scanty dry land and there is very little water for them to drink.

This period is associated with a marked loss in weight of the animals. Presently, the Government is encouraging grazing of cattle on harvested lands of groundnut tops and other leguminous forage to increase their protein intake.

No routine medication of animals is done by the herdsmen, except when an animal looks morbid then some medication will be given on the advice of a veterinary assistant. Milking of lactating animals is only done as a source of extra income and also for consumption.

On the average a cattle herd will comprise of about 10 to 20 animals. In certain areas especially in the northern parts of the country, a herd of about 3,000 animals have been encountered. On state-owned agricultural farms and agricultural research stations, the situation is different. Some pasture is grown to supplement feeding, as well as carrying out routine medication of animals. The husbandry of animals here is generally better. Cattle breeds commonly encountered in the country include the N'Dama, West African short-horn, Zebu etc. A few Holstein Freisians are also encountered on state-owned dairy farms.

3.2 Sheep and Goats

Sheep and goats are generally raised on small holdings in the cities, towns and villages and also on large scale farms.

Generally very little care is given to the animals, and they are not normally herded perhaps except on very large farms. Animals are usually allowed to graze or browse around, and there has been instances especially in the cities where backyard gardens and hedges have been grazed down by these animals.

Occasionally other feedstuffs are given, for example dried cassava, yam or plantain peels and some oilseed cakes mixed with bran. Common breeds usually encountered are the West African Dwarfs, Sahelian breeds and their crosses with the former.

3.3 Pigs

Rearing of pigs have taken on a serious turn in the country. The movement is toward intensive commercial pig production and many farms have been established for this purpose.

Pigs are fed on a variety of feedstuffs, including well-formulated rations, boiled cassava, tankage, food left overs and occasionally boiled blood mixed with cereal bran has also been fed.

The commonest breed encountered is the European Large White, the local dwarf breed and their crosses with the former.

3.4 Poultry

Poultry is commonly kept as free range in the home, in cities, towns and villages. These are usually the local hardy breeds given no care throughout their lifespan.

Presently, intensive poultry keeping has gained prominence in the country with specializations in broiler, layer and chick production. The few feed mills available have produced essentially poultry feeds, pig feeds being produced only upon request.

Commonly, exotic commercial broiler or layer breeds are kept. Occasionally chicks are flown in from abroad to boost up meat production during festive occasions like Christmas and Easter Holidays.

The local breeds are still extensively reared in homes, but their meat and egg yield are very low coupled with the long growth periods (up to one year), to attain slaughter size.

4. ANIMAL BY-PRODUCTS UTILIZATION

In Ghana, most of the available animal by-products from slaughter houses are eaten as food. The hide from slaughtered cattle is singed, cleaned, cooked and cut into suitable sizes for sale as "wélé" (ie. cooked cow hide). This product is highly cherished by many people in the country especially the low-income group who cannot afford fresh meat. All internal tissues are also eaten, except blood, urinary bladder, fetus, gall bladder etc., and from the outside, hair, hooves and horn etc. This goes with all species of livestock.

In the case of wild life, and in particular the Grasscutter (*Thryonomis swinderianus*) a rodent, all parts of the carcass are eaten including semi-digested stomach contents, except for the gall bladder and hair.

No formal processing (on a large scale), or export drive for any animal-based by products occur in the country. The Food Research Institute in Ghana had however, collected blood and bones from local slaughter houses for processing into blood and bone meal respectively. These were included in rations for poultry and pigs (blood meal replacing about 5% of the total animal protein input). Blood meal was also prepared, boiled and containing 50% of the weight of blood to wheat bran and the ration was fed to pigs. In both instances above, the rations were found to be acceptable and produced desirable effects in the stock.

Few individual farmers have been found to collect blood from various slaughter houses for feeding pigs after boiling and adding other ingredients.

With hides and skin tanning, there is only one functioning commercial tannery based in Kumasi (Ashanti Region, of Ghana). Since most of the hides are processed for food, very little actually finds its way to the tannery. Perhaps barely 1 to 2% of hides from all slaughtered animals is tanned to leather for local use.

Hides are sometimes sun dried and stored for future use. These dried hides are first reconstituted by soaking in water, before processing into food. Some dried hides are also used as mats for praying by Muslims.

The hair from slaughtered animals is not normally recovered for use, however, in some few instances, the tail with hair (especially of cattle or sheep) is preserved by drying and used by fetish priests or chiefs as a magical wand.

The bile liquid is not utilized. Infact, the gall bladder is usually carefully severed and separated from the carcass to avoid contamination of contents with the meat.

Other inedible waste, if they occur, are also not generally put to any commercial use. Occasionally, horns are collected polished and made into decorative pieces for sale. Some are also made into flutes. In one particular instance hog intestines were processed into casings for sausage filling.

5. MODE OF DISPOSAL OF INEDIBLE WASTE

In most slaughter houses, effluent including inedible wastes such as blood, faeces, ruminal and intestinal contents, etc. are inefficiently drained into open ditches and gutters. This is associated with the typical stench occurring around some slaughter houses in the country. Horns and hooves may also be packed in rubbish dumps nearby and either burned or left to decompose. The decomposing organic matter attracts many insects and birds especially flies and vultures around the vicinity of the slaughter houses.

Sometimes the situation of slaughter houses leaves much to be desired, thus it is common to see slaughter houses sited in the vicinity of a large market, industrial area or even residential areas.

6. ANNUAL AVAILABILITY OF ANIMAL-BASED RAW MATERIAL FROM SLAUGHTER HOUSES

It is very difficult to estimate the quantity of available by-products from animal-based raw material from slaughter houses in the country, since data on these raw materials are not normally collected. However, with the help of documented estimates of some of these by-products, an attempt has been made to quantify the annual yield of animal-based by-products from slaughtered cattle in the country (see Table 4 below).

* TABLE 4 : ESTIMATED BY-PRODUCT YIELD FROM LICENCED SLAUGHTERED CATTLE (1987)

By-Product (Wet-weight basis)	Yield/beast (kg)	Total yield (Metric tons)
Bones	48	3,400
Blood	15	1,100
Hide	20	1,400
Ruminal/Intestinal)	60	4,300
Contents/Horns/Hooves)		

The data in Table 4 shows that very large quantities of animal-based raw materials go down the drain annually in the country. 3,400 metric tons of fresh bones were consumed as food in the country in 1987 alone. This would be equivalent to about 1,700 metric tons of bone meal (assuming 50% loss in green weight). 1,100 metric tons of fresh blood that went to waste would have produced about 242 metric tons of blood meal with 10% moisture, (assuming blood contains 20% solids and 80% moisture). This quantity of blood meal could be used for poultry and pig feeding to replace part of the very expensive fish meal imported into the country. That quantity of bone meal would also have saved the country some hard earned foreign exchange by not importing bone meal into the country for livestock feeding.

About 1,400 metric tons of hide was also consumed in 1987 and about 4,300 metric tons of ruminal/intestinal contents/horns and hooves that went to waste could have been better utilized in the manufacture of fertilizer, for instance. If the quantity of such by-products that went to waste from sheep, goats and pigs are added including that from clandestine slaughterings, then the picture becomes clearer as to the huge amounts of material resource that go to waste in the country annually.

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- * 1. The average weight of slaughtered cattle was assumed to be 400kg.
- 2. 15kg of fresh blood was estimated for cattle when efficiently bled. (Edwards et. al., 1979).
- ** 3. 5% of body weight of cattle is made up of hide.
- ** 4. 15% of body weight of cattle is made up of ruminal/intestinal contents/horns/hooves.
- 5. 12% (Average) of the weight of beef carcass is bone. (Forrest et. al. 1975)

**

Mann, 1962

Lawrie (1985), stressed the need to re-assess the potential for making edible and attractive foods from the substantial amounts of slaughter house protein which is currently wasted.

Young and Lawrie (1974) also culculated protein concentrations in currently non-utilized slaughter house wastes and outlined methods for recovering proteins from some of these wastes (eg. lungs, blood, stomach etc. from bovine, ovine and porcine animals).

7. BY-PRODUCTS FROM THE POULTRY INDUSTRY

The poultry industry in Ghana is of a varied nature. With over 8million bird population, one is still not sure on the actual number of birds in the country. The estimate given above represent organised and identified farmers. There are yet a whole number of small-scale and seasonal poultry farmers ~~unknown~~ in the country.

The poultry industry can then be divided into three main groups, namely: Large-scale full-time; small-scale full-time and seasonal poultry farmers.

Among the full-timers can be found specializations such as meat/egg and meat/egg/chick production.

One large-scale poultry industry in Accra (Acme Hatcheries), has over 130,000 capacity hatchery, 1,500 grand parent stock and produces over 40,000 parent stock chicks per year. The farm has also over 15,000 broilers and a commercial poultry precessing plant (one of the very few in the country), which handles over 500 dressed chicken per day. Other parts packed for sale include gizzards, legs, heads and breast muscle fillets. There is a large cold store for the storage of packed meat.

Inedible waste obtained from this processing unit include intestines (boiled and fed to pigs), blood (processed into blood meal for poultry and pig feeding) and feathers (soft feathers are washed dried and made into decorative pieces or pillows). The use of the feathers has however, been stopped, thus feathers are collected and burned. Other effluents from the processing hall are washed down into underground ditches.

It is interesting to note that, it ^{is} very common in Ghana to buy live birds and slaughter at home. Dressed chicken is not the preference of many people, perhaps ignorantly they believe that the birds might have been diseased before slaughter and ~~sale~~. Perhaps, this is why there are very few commercial precessing plants in the country.

Nevertheless, in recent years, a number of frozen food shops have sprang up in the country especially in the capital, Accra, doing brisk business in frozen dressed chicken, turkey tails, legs and wings etc. The turkey tails, legs and wings are normally obtained from Togo, a neighbouring country.

8. THE FISHING INDUSTRY IN GHANA

8.1 Marine Fishing :

There are mainly two types of fishing industries in the country, namely marine (forming the bulk of total catch) and fresh water inland fishing. The marine fishing industry can again be divided into four groups :

- i) Artisanal sector - This group is formed by small-scale canoe fishermen, about 50% of them using outboard motors to power their canoes and the rest relying on the traditional paddles and sails. This sector, however contributes about 60% of the total marine fish catch in the country (see Table 5 below).
- ii) Inshore vessels - this group undertakes mechanised fishing using large boats manufactured locally and operating within the country's own continental shelf.
- iii) Distant water vessels - This group is also involved in mechanised fishing and they go out for weeks or months.
- iv) Tuna fleet - This group, again mechanised in fishing, are specialized in that they catch only Tuna fish.

Groups ii), iii) and iv) together contribute about 40% of the total marine fish catch.

TABLE 5 MARINE FISH LANDINGS IN GHANA (1987)
Source : Fisheries Department, Ministry of Agriculture, Accra

Type of fishing	Catch (metric tons)
Canoe fishing	190,196.5
Inshore vessels	21,893.7
Distant water vessels	22,344.0
Tuna fishery (Ghana flag)	34,719.9

8.2 Inland Freshwater Fishing :

This sector contributed over 50,000 metric tons of fresh water fish in 1987. However 40,000 tons of this catch came from the Volta Lake (a man-made lake created by the Volta River hydroelectric power project) alone, the rest (10,000 metric tons), being contributed by lagoons, rivers and small reservoirs. Local fish pond catch in the same year amounted to 300 metric tons.

8.3 Fish Waste Disposal From The Fishing Industry :

Fish is normally preserved by local market women in the form of hot smoked, salted or fermented fish, for both marine and freshwater fish.

Marine fish is normally smoked whole (without gutting or descaling), and this is said to keep the shape of the fish intact during turning on the fire. Freshwater fish is, however, normally gutted before preserving by salting or smoking. The small quantities of fish waste occurring from gutted freshwater fish normally goes down the drain unutilized.

Fish waste occurring from fish canning industries include fish heads, bones and gut. These are steam cooked, defatted, dried and ground into fish meal for use in poultry and pig rations.

Very small amounts of canned fish is produced locally so the bulk of fish catch is preserved by local women as smoked, salted or fermented fish. Small amount of fish is, however, sold in ice or frozen and sold as such. In event of fluctuating power supply or long power cuts, frozen fish may warm up and undergo decay. Such off-flavoured fish has occasionally been

processed into fish meal. Unsold iced fish may also be smoked dry to extend shelf life until sold.

Fish waste occurring from fish markets especially from smoked fish are sold out to farmers for poultry and pig feeding.

9. IMPORTS OF PRODUCTS FROM ANIMAL BASED RAW MATERIALS

Since no commercial processing plants exist for upgrading slaughter house wastes, products made from these animal-based raw materials that are utilized in the country are mainly imported, they include : premixes, dicalcium phosphate, fish meal, leather, animal glue, brushes, surgical materials etc.

Fish meal, bone meal and leather are only produced in small quantities locally and cannot meet their increasing demand in the country.

10. CONCLUSION

The quantities of animal-based material resources that go to waste in this country indicates poor management and development of human skills and material resources. It is very clear then, that these skills be developed to fully exploit the maximum utilization of such cheap material resources such as animal-based by-products for the benefit of humans and animals alike.

This will bring developing countries such benefits as savings in foreign exchange, improvement in human skills and above all better environmental quality.

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