



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

***AN ASSESSMENT OF THE QUALITY OF LIVESTOCK
STATISTICS IN BANGLADESH***

M. A. Jabber

ABSTRACT

The accuracy of available livestock data for the period 1960-85 have been assessed by examining the rationality of various assumptions under which such data were generated. The review shows that the aggregate data on livestock population and products have been generated under a set of inconsistent and often unrealistic assumptions with respect to calving, mortality, slaughter rates, import and consumption of livestock products. It is suggested that available micro-level research and survey results should be used to formulate assumptions for generating macro data. Potential new research areas are also suggested.

1. INTRODUCTION

Livestock is an important component of the mixed farming system practised in Bangladesh. The estimated contribution of the livestock sector to GDP has increased from 4.8 per cent in 1981-82 to 6.8 per cent in 1985-86 (BBS 1988, p. 416). Sometimes it is argued that the real contribution of the livestock sector is generally underestimated by more than a third because in conventional GDP calculation the values of draught power and animal dung (used as manure and fuel) are not included (see for example, Dickey and Huque 1986, p. 4 and 21). It can be conversely argued that the values of paddy straw and other crop residues, which are the main animal feeds, are also not included in crop sector GDP calculation. Ideally these items should be included in the national input-output and social accounting matrices. So far that has not been done most probably because of lack of accurate data. Available data on livestock have been considered both inadequate and poor in quality compared to crop statistics (Pray 1980; Jabber and Green 1983).

The paper was written in 1988 while the author was a Hallsworth Research Fellow at the University of Manchester, UK. Currently he is an Agricultural Economist, International Livestock Centre for Africa, Humid Zone Programme, Ibadan, Nigeria. Comments of an anonymous referee on an earlier draft is gratefully acknowledged.

The objective of this paper is to bring together all the available data on livestock population and products and assess their accuracy by examining the rationality of various implicit and explicit assumptions under which such data were generated. Available data from various micro-level research/surveys will be used to examine the rationality of the assumptions and the resulting data.

II. REVIEW OF LIVESTOCK POPULATION DATA

Data on livestock population for the period 1960-85 derived from three sets of sources are shown in Table 1. The figures for the first set are based on the agricultural censuses conducted in 1960, 1977 and 1983-84. Figures for the second set are derived from different five-year development plan documents where the actual sources of the data are not mentioned. The third set has been derived from annual publications of the Bangladesh Bureau of Statistics which is the principal agency responsible for collection, compilation and publication of statistics on all sectors of the economy and BBS data are the most widely used for research, policy and planning purposes.

A brief description on the nature of and the link between the three sets of data sources is presented before examining their accuracy. The 1960 census data was actually based on a large sample survey. Throughout the 1960s, yearly livestock population used to be estimated on the basis of assumed growth rate with the 1960 census as the base. A cyclone in the southern districts in November 1970 resulted in the loss of a large number of animals and birds. The estimate for lost cattle varies from 0.47 to 2.8 million. Further, an estimated 2.3 million cattle were slaughtered for meat by the Pakistani army during the war of independence in 1971 (Samad 1971; Mettrick 1976; Odendhal 1978). These losses are reflected in the lower cattle population figures reported in the First Five Year plan in 1973. A similar low level estimate was made by the World Bank in 1972 (IBRD 1972).

In a 1977 yearbook, BBS published livestock population figures for 1965, 1970 and 1972/73-1975/76 (Table 1). It appears from the pattern of the figures that the 1960 census figures for cattle and goat were blown up under assumed herd growth rate and the losses for 1970-71 were then adjusted. Poultry numbers were assumed unchanged after 1972/73.

Table 1. Livestock population in Bangladesh 1960-85

| Source of data | Reference year | Population, mil. head | | | Indices of change (1960=100) | | |
|----------------|----------------|-----------------------|------|---------|------------------------------|------|---------|
| | | Cattle | Goat | Poultry | Cattle | Goat | Poultry |
| GOP 1961 | 1960 | 19.4 | 6.1 | 20.1 | 100 | 100 | 100 |
| BBS 1981 | 1977 | 11.0 | 8.9 | 41.5 | 108 | 146 | 206 |
| BBS 1986a | 1983/84 | 22.1 | 14.2 | 73.7 | 114 | 232 | 367 |
| GOB 1973 | 1970/71 | 18.8 | na | na | 97 | na | na |
| GOB 1980 | 1979/80 | 31.0 | 13.0 | 64.9 | 160 | 212 | 323 |
| GOB 1985 | 1985 | 23.2 | 10.7 | 84.2 | 120 | 175 | 420 |
| BBS 1977 | 1965 | 23.6 | 9.9 | 52.9 | 122 | 161 | 263 |
| | 1970 | 26.7 | 9.5 | 66.2 | 138 | 158 | 329 |
| | 1972/73 | 24.9 | 8.3 | 51.0 | 128 | 135 | 254 |
| | 1973/74 | 25.4 | 8.5 | 51.0 | 131 | 139 | 254 |
| | 1974/75 | 25.9 | 8.7 | 51.0 | 133 | 142 | 254 |
| BBS 1982 | 1975/76 | 26.5 | 9.0 | 51.0 | 136 | 146 | 254 |
| | 1977/78 | 21.2 | 9.1 | 41.5 | 109 | 149 | 206 |
| | 1978/79 | 21.5 | 9.3 | 41.5 | 111 | 152 | 206 |
| | 1979/80 | 21.8 | 9.6 | 41.5 | 112 | 156 | 206 |
| BBS 1986b | 1981/82 | 22.4 | 10.0 | 70.9 | 115 | 163 | 353 |
| | 1982/83 | 22.7 | 10.2 | 75.1 | 117 | 167 | 374 |
| | 1983/84 | 23.1 | 10.5 | 79.4 | 119 | 171 | 395 |
| | 1984/85 | 23.4 | 10.7 | 84.4 | 121 | 174 | 420 |

Note : Cattle population include 2-3 percent buffaloes, goat population include 2-4 percent sheep, and poultry include 4-5 percent duck.

In 1977, a joint FAO-Bangladesh team prepared a number of papers including one on livestock for the Ministry of Agriculture to guide its policy. This team's estimate for cattle and goat population for 1976/77 were 23.2 and 7.0 million respectively which were lower than those estimated by BBS but the team estimate of 64.4 million poultry was significantly higher than the BBS estimate. The basis of FAO-Bangladesh team's estimate were not made known.

In 1980, the planning commission set targets for the second five-year plan (1980-85) on the basis of very high livestock population figures for 1979/80. The actual basis of these figures were not mentioned. In 1981, BBS published the results of the 1977 Agriculture and Livestock Census which was conducted in 14 percent sample villages throughout the country. Households owning less than a certain number of poultry and goat were not sampled, so there was some amount of under-estimation but the census figures were, by strange coincidence, close to the 1977 FAO-Bangladesh team's estimate.

In 1982, BBS published yearly figures for three years taking 1977 Census as the base. Cattle and goat numbers were increased at assumed herd growth rates but the poultry population was kept unchanged. In 1985, the Planning Commission apparently used its own estimates for preparing livestock development targets for the Third Five Year Plan (1985-90). This time the Commission climbed down from its 1980 estimates of cattle and goat population but climbed up heavily in the case of poultry population.

In 1986, BBS published the results of the 1983/84 Census of Agriculture and Livestock which was conducted in the rural areas on a full count basis. A separate census was conducted in the urban areas but the results were not available at the time of writing this paper. In the 1986 edition of the Statistical Pocketbook, BBS published its own yearly estimate of livestock population for 1981/82-1984/85 as well as the 1983/84 census figures. In this latest yearly series, cattle and goat numbers appear to have been extrapolated from the previous series published in 1982 but poultry population has no relation to the previous series. However, compared to the 1983/84 census estimate, BBS estimate for cattle and poultry population for 1983/84 appear to be higher by one and 5.7 millions respectively but goat numbers are 3.7 million lower. BBS is now in the process of releasing new yearly estimates using 1983/84 census figures as the base,

Thus the general pattern appears to be that the BBS has made yearly estimate of livestock population for the inter-censal periods on the basis of assumed herd growth rate and such estimates have been revised once the results of a new census was available. But the census estimates are also of dubious quality. During each of the two inter-censal periods, cattle population increased by about 1.5 million but changes in the structure of the herd were significantly different (Table 2). Between 1960 and 1977, adult male and female

cattle increased respectively by 14.0 and 66.5 percent but between 1977 and 1983/84, they increased only at the rate of 5.5 percent. Between 1960 and 1977, the number of young cattle decreased by 25 percent in spite of a 59.5 percent increase in the number of milk cows while between 1977 and 1983/84, number of young cattle increased by 12.4 percent along with 24.1 percent increases in the number of milk cows; number of dry cows increased by 75 percent during 1960-77 but decreased by 15 percent during 1983/84.

The plausibility of the above changes in herd structure, which apparently appear to be perverse, will be examined as we go along reviewing the data on

Table 2. Inter-censal changes in the composition of cattle population

| Type of Cattle | 000 head | | | % Change | |
|-------------------------|----------|-------|---------|----------|--------------|
| | 1960 | 1977 | 1983/84 | 1960-77 | 1977-1983/84 |
| Young under 3 yrs. | | | | | |
| Male | — | 2764 | 3047 | — | 10.2 |
| Female | — | 3422 | 3907 | — | 14.2 |
| Total | 8254 | 6186 | 6954 | -25.0 | 12.4 |
| Male over 3 yrs. | 6675 | 7610 | 8026 | 14.0 | 5.5 |
| Female over 3 yrs. | 4032 | 6713 | 7082 | 66.5 | 5.5 |
| Milk cows | 2226 | 3547 | 4401a | 59.3 | 24.1 |
| Dry cows ^b | 1806 | 3166 | 2681 | 75.3 | -15.3 |
| Draft cows ^c | 2827 | 3315 | 3192 | 17.3 | -3.3 |
| All Male | — | 10374 | 11073 | — | 6.7 |
| All Female | — | 10131 | 10989 | — | 8.5 |
| All Cattle | 18961 | 20509 | 22062 | 8.2 | 7.6 |

(a) Seventy-seven percent of the milk cows were in milk at the time of the Census. This distinction was not made in 1960 and 1977 census reports, possibly because in these censuses cows not in-milk were treated as dry cows.

(b) Includes barren cows.

(c) Includes dry and milk cows.

— Not available/applicable.

Source : BBS 1981, pp.293-4; BBS 1986 b, p.60.

calving/birth rate, slaughter rate for meat, mortality and net import, which together determine herd growth rate.

Calving / Birth Rate

Calving rate is normally defined as the ratio between the number of calves born and the number of cows serviced. Because of the unavailability of appropriate national level data to measure this ratio, calving rate has been defined as the ratio of number milk cows to the number of adult females and census data has been used to measure it. So calculated, we get calving rates of 55, 53 and 48 percent for 1960, 1977 and 1983/84 respectively. Some small field surveys conducted during post-1977 years show much lower calving rates and they also show that draught cows have significantly lower calving rates than milk cows (Table 3).

Until the partition of India in 1947, mainly barren cows were used for draught. By 1960, 70 percent of the adult cows were used for draught. By

Table 3. Calving rates for milk and draught cows, selected samples

| Survey year | Sample villages | Sample farms | Adult cows | Calving rate (%) | |
|-------------|-----------------|--------------|------------|--------------------|-------------|
| | | | | Milk cow | Draught cow |
| 1978/79 | 10 | 360 | 274 | 35 | 25 |
| 1981a | 3 | 500 | 644 | 27 | 24 |
| 1984/85 | 2 | 193 | 211 | 36 | 24 |

(a) Although this survey shows little difference in calving rates of milk and draught cows, other measures of fertility, e.g. number of calves per cows lifetime, age at first calving, services per conception, show significantly poorer performance of draught cows. For details see (Jabbar and Green 1983, pp.37-48). For more recent evidence on the performance of milk vs. draught cows, see (Jabbar and Ali, 1988).

Source : For 1978/79, Mettrick 1981,
 1981, Jabbar and Green 1983,
 1984/85, Field Survey by the present author in Uzan Ghagra and Char Iswardia villages in Mymensingh Upazila, under a project funded by the Ford Foundation.

1977, the number of draught cows had further increased though its proportion in total female slightly decreased¹ (Table 2). Such a rapid increase in the number of cows for draught and a consequent decline in their calving rate, as indicated by the surveys, means that a general decline in overall calving rate as evidenced by the censuses, could be expected. However, a 25 percent decline in young cattle numbers along with a 59 percent increase in milk cows between 1960 and 1977 would require the calving rate to fall drastically at the levels found in the surveys. Alternatively, a high rate of calf mortality might produce similar results. If, in reality, either the calving rate had fallen drastically or calf mortality had increased significantly during the 1960-77 period, then a drastic reversal of these trends would be required during post-1977 period in order to produce a herd structure revealed by the 1983/84 census.

Theoretically, the negative effect on fertility of draught could be minimised by giving feed supplement to draught cows to compensate for their hard work. In reality, the animal feed situation has deteriorated rapidly since the late 1960s. The quantity and quality of paddy straw, the main roughage, has deteriorated with the increase in the area under HYVs which give lower straw yield of lesser quality (digestibility). More and more paddy is processed in huller mills whereby much of rice bran is lost which otherwise would be fed to the animals. HYVs of paddy and wheat have partly replaced pulses and oilseeds, so the supply of protein feeds obtained as by-products from these crops has declined. Area under green fodder has continuously declined from about 27,000 acres in 1974/75 to about 15,000 acres in 1983/84 (for details and quantitative evidence, see, Jabbar and Green 1983; BBS 1985),

The small farmers who mostly use draught cows have been the hardest hit as a result of the deteriorating feed situation. So, it is highly likely that birth rate has fallen further in the post-1977 period rather than the other way round. Therefore, the implied changes in herd structure between 1977 and 1984 appears to be unrealistic.

Slaughter Rates

National level data on slaughter rate is not readily available. It has been

1. Reasons for recent increases in the use of milk cows for draft may be found in (Jabbar and Green 1983), and (Jabbar and Ali 1988).

shown above that BBS had estimated yearly livestock population under assumed herd growth rate. In doing so, BBS also made implicit assumptions, among other things, about slaughter rates which have been derived and presented in Table 4. The slaughter rate has been derived as the ratio of edible offals or heads to the corresponding yearly population shown in Table 1. The reason for not using skins output for estimating slaughter rate will become evident later.

Data presented in Table 4. show a number of inconsistencies. First, the assumed slaughter rate remained unchanged for the two four-year series published in 1977 and 1982 but downward adjustments were made in the numbers of edible offals for the period 1976/77-1979/80. This adjustment followed the same pattern as the adjustment in the number of cattle and goat population shown in Table 1.

Second, in the latest BBS publications, both numbers of edible offals produced and the assumed slaughter rates for the 1977/78-1979/80 period have been revised upward. For the subsequent years, slaughter rates for cattle has been further increased, but slaughter rates for goat has been first increased, then suddenly decreased by almost half. The reason for this revision and the resulting inconsistency with the 1982 series are not known.

BBS estimates of quantities of meat produced and per caput availability of meat are shown in Table 5. They reveal similar patterns and inconsistencies as the production of edible offals and heads and the implied slaughter rates shown in Table 4. In fact, the data in Tables 4 and 5 indicate that BBS either start with assumed slaughter rate and derive production data on meat, edible offals, and heads or start with assumed per caput availability and consumption of meat and derive production figures on that basis. Either way, the assumptions and the resulting data remain highly inconsistent and dubious. The assumed or estimated per caput availability of meat appear to be unrealistic in view of the findings of the Household Expenditure Surveys conducted in 1973/74, 1976/77 and 1981/82 by BBS and the Nutrition Surveys conducted in 1962/64 and 1975/76 by the Dhaka University. The results of these surveys (Table 6) show significant differences but in general they also show much lower consumption levels than those assumed by BBS. In the absence of direct data on meat production, consumption levels found in the expenditure and nutrition surveys might provide an objective basis for estimating

Table 4. : Number of offals and hides of cattle and goat produced and implied slaughter rates. 1971/73-1984/85

| Year | Edible offals | | Estimated Slaughter Rate | |
|----------|---------------|-------|--------------------------|-------|
| | Cattle | Goats | Cattle | Goats |
| | 000 pieces | | Per cent | |
| 1972/73a | 2465 | 3909 | 9.9 | 47.2 |
| 1973/74 | 2518 | 4005 | 9.9 | 47.1 |
| 1974/75 | 2572 | 4103 | 9.9 | 46.9 |
| 1975/76 | 2628 | 4206 | 9.9 | 46.8 |
| 1976/77b | 2074 | 4345 | n.e | n.e |
| 1977/78 | 2101 | 4446 | 9.9 | 48.6 |
| 1978/79 | 2127 | 4549 | 9.9 | 48.6 |
| 1979/80 | 2154 | 4654 | 9.9 | 48.6 |
| 1977/78c | 3123 | 6419 | 14.7 | 70.2 |
| 1978/79 | 3241 | 6804 | 15.1 | 72.7 |
| 1979/80 | 3383 | 7213 | 15.5 | 75.4 |
| 1980/81 | 3428 | 7379 | n.e | n.e |
| 1981/82 | 3664 | 8105 | 16.4 | 81.0 |
| 1982/83 | 3803 | 8591 | 16.7 | 84.0 |
| 1983/84 | 4455 | 5102 | 19.3 | 48.8 |
| 1984/85 | 4620 | 5220 | 19.7 | 48.8 |

n. e. Not estimated because of unavailability of population data from BBS.

Source : (a) BBS 1977, p. 167.

(b) BBS 1982, p. 282.

(c) BBS 1985, pp. 411-26 and BBS 1986a, pp. 259-60.

aggregate production data. Then slaughter rate could be derived under assumed carcass weight.

This later approach also would have limitations in generating accurate slaughter rate because a reasonable assumption about carcass weight would require knowledge about age-sex and health characteristics of the slaughtered

Table 5 : Production and per caput availability of meat, 1972/73-1984/85

| Year | Production, 000 tons | | | Estimated availability, gm/ caput/day | | | |
|----------------------|----------------------|--------|---------|---------------------------------------|--------|---------|-------|
| | Beef | Mutton | Chicken | Beef | Mutton | Chicken | Total |
| 1972/73 ^a | 138.4 | 27.3 | 41.7 | 5.2 | 1.0 | 1.6 | 7.8 |
| 1973/74 | 141.4 | 28.0 | 41.7 | 5.2 | 1.0 | 1.5 | 7.7 |
| 1974/75 | 144.4 | 28.8 | 41.7 | 5.1 | 1.0 | 1.5 | 7.6 |
| 1975/76 | 147.5 | 29.4 | 41.7 | 5.1 | 1.0 | 1.4 | 7.5 |
| 1976/77 ^b | 116.8 | 30.4 | 39.0 | 3.9 | 1.0 | 1.3 | 6.2 |
| 1977/78 | 117.9 | 31.1 | 41.3 | 3.9 | 1.0 | 1.3 | 6.2 |
| 1978/79 | 119.6 | 31.8 | 43.5 | 3.8 | 1.0 | 1.3 | 6.1 |
| 1979/80 | 121.1 | 32.6 | 46.0 | 3.8 | 1.0 | 1.3 | 6.1 |
| 1977/78 ^c | 176.2 | 44.9 | 61.7 | 5.8 | 1.5 | 2.0 | 9.3 |
| 1978/79 | 183.4 | 47.6 | 65.5 | 5.8 | 1.5 | 2.0 | 9.3 |
| 1979/80 | 191.0 | 50.5 | 68.7 | 5.8 | 1.5 | 2.0 | 9.3 |
| 1980/81 | 190.5 | 51.8 | 75.7 | 5.8 | 1.5 | 2.0 | 9.3 |
| 1981/82 | 206.9 | 56.7 | 75.8 | 6.1 | 1.7 | 2.2 | 10.0 |
| 1982/83 | 215.4 | 60.1 | 79.6 | 6.2 | 1.7 | 2.3 | 10.2 |
| 1983/84 | 275.0 | 47.3 | 58.0 | 7.7 | 1.3 | 1.6 | 10.6 |
| 1984/85 | 278.9 | 48.4 | 61.5 | 7.6 | 1.3 | 1.7 | 10.6 |

Source : (a) BBS 1977, pp. 167-68.

(b) BBS 1982, pp. 282-84.

(c) BBS, 1985, pp. 411-26 and BBS 1986a pp. 29-60.

animals and birds. Few animals and birds are raised commercially and slaughtered at the optimum age or body weight. Detailed age structure of the animals and birds are not available from the censuses but some field surveys show that about one-quarter of the cattle population are over the productive age of 9 years and 3-5 percent are about 15 years old. On the other hand, nearly half of the slaughtered males and over 80 percent of the slaughtered females are in their prime productive age of below 7 years. Similar patterns are observed in the case of goats (Table 7). The reasons for such opposite pictures is that poor farmers continue to maintain old and emaciated cows and goats possibly due to their inability to acquire and maintain better quality

Table 6 : Average daily meat consumption derived from household expenditure and nutrition surveys, selected years

| Year | Consumption, gm/caput/day | | | |
|---------|---------------------------|--------|---------|-------|
| | Beef | Mutton | Chicken | Total |
| 1962/64 | — | — | — | 5.94 |
| 1973/74 | 2.19 | 2.20 | 1.76 | 6.15 |
| 1975/76 | — | — | — | 3.80 |
| 1976/77 | 1.90 | 1.90 | 2.80 | 6.60 |
| 1981/82 | 2.12 | 0.84 | 2.27 | 5.23 |

Source : Quoted in BBS 1980, p. 579; BBS 1986c, p. 25.

Table 7 : Age structure of cattle herd and slaughtered cattle and goat, selected samples

| Agr. years | % Cattle by Sex | | % slaughtered cattle | | % slaughtered goat | |
|-------------------|-----------------|--------|----------------------|--------|--------------------|---------|
| | Male | Female | by sex | | Male | Female |
| | | | Male | Female | | |
| under 1 | 10.2 | 7.4 | — | — | 12.7 | 7.4 |
| 1—1.9 | 10.3 | 8.3 | — | — | 47.9 | 26.4 |
| 2—2.9 | 8.1 | 9.7 | 7.2 | 7.0 | 26.7 | 30.2 |
| 3—4.9 | 10.9 | 14.8 | 19.1 | 16.8 | 10.8 | 26.9 |
| 5—6.9 | 14.2 | 17.4 | 17.8 | 59.0 | 1.1 | 5.2 |
| 7—8.9 | 20.3 | 19.3 | 11.2 | 10.5 | — | 1.7 |
| 9+ | 26.0 | 23.1 | 44.7 | 6.7 | — | — |
| All | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Number of animals | 1192 | 1490 | 32193 | 16907 | 258,816 | 307,600 |

Source : For herd structure, weighted average of 15 sample villages mentioned in Table 3.

For slaughtered animals, slaughter house records of Dhaka and Chittagong cities for 1980-81 and a survey on sacrificial animals conducted in 114 villages in 1981. For details see, (Jabbar and Green 1983).

animals and because these animals may serve the function of store of value for their meagre savings. They are sold when cash is needed and are rarely sold when they stop growing. On the other hand, majority of the animals are slaughtered for daily meat in the urban areas and on special occasions, e. g. Eid-ul-Azha; in both the cases better quality animals are sought and preferred.

Whatever is the reason for these differences in the age-sex characteristics of the reared and slaughtered animals, they are bound to influence the calving and mortality rates and the overall herd dynamics unless a significant proportion of the slaughtered animals are imported. There is no legal international trading in live animals so there is no official record or estimate but it is known that a substantial number are smuggled in from India. Huq and Huq (1985) have reported on the basis of their subjective assessment in the India-Bangladesh border zones, that about 50 percent of the cattle sacrificed in the country and slaughtered in the cities might be smuggled in from India.

Mortality:

Like slaughter rate, BBS also implicitly assumed mortality rate but we cannot derive it from any published data. An examination of the yearly production of edible offals/heads (slaughter rate) and hides show that the number of hides produced is consistently larger. This is so because some hides are collected from dead animals. Since hides of dead calf and very young animals are not collected at all and hides are collected from some adult dead animals, only a part of total mortality can be derived from hides data. An examination of this partial mortality may give us some idea about the trend of BBS assumption and its accuracy.

Information on the yearly production of hides and the proportion of hides derived from dead animals are shown in Table 8. It appears that the number of hides production for 1976/77-1979/80 period was revised downwards in 1982, then revised upward again in 1985 and 1986 reports but for the entire period except the last two years, a constant proportion of hides collection from dead animals has been assumed. Consequently, the pattern of adjustment in the number of hides follow the same pattern as the number of heads and edible offals produced (Table 4) and the livestock population (Table 1). Hides production data was expected to be more consistent and

Table 8 : Number of hides, produced and proportion of hides derived from dead animals. 1972/73-1984/85

| Year | Number of hides, 000 pieces | | %hides derived from dead animals | |
|----------------------|-----------------------------|------|----------------------------------|------|
| | Cattle | Goat | Cattle | Goat |
| 1972/73 ^a | 3091 | 4406 | 20.3 | 11.3 |
| 1973/74 | 3158 | 4515 | 20.3 | 11.3 |
| 1974/75 | 3225 | 4627 | 20.3 | 11.3 |
| 1975/76 | 3296 | 4745 | 20.3 | 11.3 |
| 1976/77 ^b | 2603 | 4881 | 20.3 | 11.3 |
| 1977/78 | 2637 | 4995 | 20.3 | 11.3 |
| 1978/79 | 2670 | 5110 | 20.3 | 11.3 |
| 1979/80 | 2703 | 5228 | 20.3 | 11.3 |
| 1977/78 ^c | 3936 | 7219 | 20.7 | 11.1 |
| 1978/79 | 4096 | 7605 | 20.9 | 10.5 |
| 1979/80 | 4301 | 8113 | 21.3 | 11.1 |
| 1980/81 | 4325 | 8299 | 20.7 | 11.1 |
| 1981/82 | 4622 | 9116 | 20.7 | 11.1 |
| 1982/83 | 4797 | 9662 | 20.7 | 11.1 |
| 1983/84 | 5138 | 5729 | 13.3 | 10.9 |
| 1984/85 | 5211 | 5862 | 11.3 | 11.0 |

Source : (a) BBS 1977, p. 167

(b) BBS 1982, p. 282

(c) BBS 1985, pp. 411-26 and BBS 1986a, pp. 259-60.

reliable because a large proportion of the hides is exported but in reality, hides data also do not appear to be reliable.

In planning and other documents, high rate of livestock mortality is stated, generally without putting any number but sometimes a number may also be mentioned. For example, in a country report prepared by the FAO, 60 percent mortality of calves up to weaning was mentioned (FAO 1976, p. 103), but the basis of the figure was not explained. Some small field surveys show much smaller calf and overall mortality (Table 9). Several factors including the size of the samples might have contributed to the

Table 9 : Age-specific cattle mortality rates, selected samples

| Age class, yrs. | % mortality in cattle by sample year | | |
|-----------------|--------------------------------------|---------|---------|
| | 1981 | 1984/85 | 1984/85 |
| Under 1 | 22.2 | 19.2 | 10.1 |
| 1-3 | 14.4 | — | — |
| 1-10 | — | 12.4 | 4.3 |
| 3+ | 7.7 | — | — |
| 10+ | — | 17.6 | 5.0 |
| All | 10.8 | 12.7 | 6.1 |

—not available.

Source : As in Table 3.

variation in the mortality rates between the samples but in general they show that the FAO assumption was far too high. A 60 percent calf mortality would require a more than 60 percent calving rate in order to maintain a stable herd, let alone grow it. We have shown earlier that calving rate was much lower than 60 percent and it was declining due to draught use of cows. In view of the fact that herd size has grown significantly in spite of low and declining calving rate, it seems reasonable to assume that actual mortality was within the bounds of the figures generated by the surveys.

Inter-censal changes in cattle herd structure : synthesis

The detailed review above shows that BBS data and/or assumptions on calving, slaughter and mortality rates are inconsistent and unreliable, so they are inappropriate for explaining the perverse changes in the cattle herd structure between the three census years. Data generated by a few small surveys show considerable variation but it may be reasonably assumed that they lie within the bounds of the reality. So viewed, the survey results were used, in the form of alternative sets of assumptions with respect to calving, slaughter, mortality and import (smuggling), to simulate the 1960 cattle herd structure up to 1977 and the 1977 herd up to 1984. The objective was to find out the conditions (set of assumptions) under which one herd structure might transform into another. As in the census reports, cattle were

classified into three age groups : calf under one year, young up to 3 years and adult.

Several sets of assumptions were tried by changing the value of one or more variable. The exercise produced quite unsatisfactory results, in terms of both the size and structure of the herd, for the 1960-77 simulation. The 1977-84 simulation shows that the herd size of 1984 could be more or less reached under the assumptions described below but the herd structure of 1984 did not match with any simulation results.

| Parameter | Assumed value (%) | | |
|------------------------------|-------------------|------------------|----|
| | A | B | C |
| Calving/birth rate : All Cow | 40 | 30 | 30 |
| milk cow | — | 40 | 40 |
| draught cow | — | 26 | 26 |
| Mortality : overall | 10 | 10 | 8 |
| under 1 yr | 22 | 22 | 15 |
| 1—3 yrs | 14 | 14 | 10 |
| 3+ | 7 | 7 | 6 |
| Slaughter Rate | 20 | 10 | 10 |
| Import (smuggling) | — | 50 | 25 |
| | | (of slaughter) | |

It appears that the herd size is sensitive to calving, slaughter, mortality and smuggling rates. In 1977, 49% of the adult cows were used for draught. A herd with that many draught cows would grow up to the 1984 size with about 30 percent overall calving rate, 8-10 percent overall mortality, and a significant amount of smuggling of animals for slaughter. Without smuggling, the herd size would remain stable at the 1977 level or would grow if calving rate was over 40 percent and/or mortality was 3-5 percent. The survey results indicated that these later conditions were unlikely to hold.

There are two possible reasons for the unsatisfactory results for the 1960-1977 simulation and about the herd structure in the 1977-84 simulation. First, the animals lost during the 1970 flood and the 1971 war might have some influence on the size and composition of the herd in the subsequent years. But, as explained earlier, reliable estimate of the number and composition of the lost animals was not available, so proper adjustment could not be made in the

simulation exercise. Second, age-groupings in the census are too aggregated so the actual impact on herd structure of the wide variability in age-sex specific calving, slaughter and mortality rates, as found in the surveys, could not be measured.

III. REVIEW OF DATA ON LIVESTOCK PRODUCTS

Available data on meat production and availability have been reviewed earlier. Table 10 shows BBS estimates of production of some other livestock products. The general pattern of these estimates are similar to other categories of information reviewed earlier, i. e., production figures were adjusted downward in 1982 for the period 1976/77-1979/80 but in 1985 and 1986 reports, figures for these and subsequent years have been revised upwards. The reasons are not known.

The estimated fluid milk production during 1972/73-1975/76 gave per caput per day availability of 13.5 gms but the 1973/74 Household Expenditure Survey, conducted by BBS, shows per day consumption of 29.6 gms (BBS 1977, p. 406). The estimated production for 1981/82 gives per caput per day availability of 17.0 gms; 1981/82 Household Expenditure Survey conducted by BBS shows per caput daily consumption of 17.1 gms (BBS 1986b, p.25). This indicates that recent milk production data might have been estimated on the basis of consumption data.

Given these inconsistencies, the importance of actions for generating reliable production and consumption data can hardly be over emphasized.

IV. CONCLUSIONS

This review shows that BBS has been generating aggregate data on livestock population and products under a set of implicit symmetric but inconsistent assumptions with respect to calving, mortality, slaughter rates and consumption of livestock products. The assumptions are symmetric in the sense that any change in the data/assumption has been systematically applied to all the categories of data being generated. The assumptions are inconsistent because different sets of assumptions appear to have been followed at times for the same reference year but published in separate reports and one set of assump-

tion has been replaced by another set without any logical basis. BBS assumptions also appear to be unrealistic when compared with research and survey results some of which, e.g. household expenditure surveys, were conducted by BBS itself. Consequently, one finds a consistent set of data for any single year or for a few consecutive years but when all the available data are arranged in a time series, they appear totally inconsistent and unrealistic.

So far three Agriculture-cum-Livestock Censuses have been conducted in 1960-1977 and 1983/84. These censuses were expected to produce accurate livestock population figures but inter-causal changes in herd structure show some unusual characteristics which could be partly explained if it is accepted that (a) calving rate has fallen drastically due to draught use of a large number of cows, (b) a large number of animals are illegally imported for slaughter thus compensate the effect of reduced calving rate. Some evidence on the effect of draught on calving rate and milk production is already available.

The review shows that BBS should be more careful and consistent in generating aggregate data and that the findings of available research and survey results should be used for generating data or at least for formulating assumptions. Serious and urgent attention should be given to generate more data on the effect of (c) draught use of cows (because 50 percent of the cows are used for draught), (b) illegal trading in live animals, and (c) mortality, on the size and composition of the herd. Otherwise, policy planning for this vital sector will remain as misdirected as ever.

REFERENCES

- BBS (1977). *Statistical Pocket Book of Bangladesh*. Dhaka : Ministry of Planning.
- BBS (1980). *Yearbook of Agricultural Statistics*. Dhaka : Ministry of Planning.
- BBS (1981). *Report on the Agricultural Census of Bangladesh 1977*. (National volume). Dhaka : Ministry of Planning.
- BBS (1982). *Statistical Pocket Book of Bangladesh*. Dhaka : Ministry of Planning.
- BBS (1985). *Yearbook of Agricultural Statistics of Bangladesh, 1984-85*. Dhaka : Ministry of Planning.
- BBS (1986a). *Report of the Bangladesh Household Expenditure Survey 1981/82*. Dhaka : Ministry of Planning.
- BBS (1986b). *Statistical Pocket Book of Bangladesh*. Dhaka : Ministry of Planning.

- BBS (1986c). *The Bangladesh Census of Agriculture and Livestock, 1983-84*. Volume I. Dhaka: Ministry of Planning.
- Dickey, J.R. and Huque, Q.M.E. (1985). *Status of the Bangladesh Livestock Industry in Relation to Fodder Supply and to Consumption of Animal Products*. Dhaka: Bangladesh Agricultural Research Council.
- FAO (1976). *Working Document for Agricultural Mission to Bangladesh*. Rome: United Nations (Unpublished draft).
- FAO (1977). *Livestock and Draught Power Development Working Paper V*. Dhaka: Government of Bangladesh and FAO/UNDP Mission (Mimeo).
- GOB (1973). *The First Five Year Plan 1973-78*. Dhaka: Ministry of Planning.
- GOB (1980). *The Second Five Year Plan 1980-85*. Dhaka: Ministry of Planning.
- GOB (1985). *The Third Five Year Plan 1985-90*. Dhaka: Ministry of Planning.
- GOP (1961). *Pakistan Census of Agriculture, 1960*. Karachi: Census Wing, Ministry of Agriculture, Government of Pakistan.
- Huq, M. and Huq, A. (1985). *Socio economic Analysis of Livestock Marketing in Bangladesh*. Dhaka: Winrock International.
- IBRD (1972). *Land and Water Resources Sector Study, Bangladesh*. Volume IV. Washington, D.C. World Bank.
- Jabber, M.A. and Green, D.A.G. (1983). *The Status and Potential of Livestock within the Context of Agricultural Development Policy in Bangladesh*. Aberystwyth, Dept. of Agricultural Economics, University College of Wales.
- Jabber, M.A. and Ali, S.Z. (1988). *The Limitations of Cross-Breeding for Improvement of Cattle in Bangladesh*. *Oxford Agrarian Studies*, (17), 1988.
- Odend'hal, Stewart (1978). *Past, Present and Future Research on Livestock in Bangladesh with Particular Emphasis on Draught Power and Mechanization*. Dhaka: The Ford Foundation.
- Mettrick, H. (1981). "Some Aspects of the Economics of Animal Power", In *Farm Power in Bangladesh, Volume II*. Development Study No. 20 Reading: Dept. of Agricultural Economics and Management, University of Reading.
- Pray, Carl E. (1980). "An Assessment of the Accuracy of the Official Agricultural Statistics of Bangladesh". *The Bangladesh Development Studies*, 8, 1-2 (Winter-Summer), 1-38.
- Samad, M.A. (1971). *Cyclone of 1970 and Agricultural Rehabilitation*. Dhaka: Agriculture Information Service, Ministry of Agriculture.