

Foaling and mortality of equines in The Gambia: a national survey

By

J. Sowe¹, B. Gai², J. Sumberg² and E. Gilbert³

Ministry of Agriculture, The Gambia

Abstract

A national survey of 642 Dabadas in The Gambia was conducted in December 1987 to determine foaling and mortality rates for horses and donkeys. Foaling rates were estimated at 24% for horses and 29% for donkeys, while the overall mortality was 27% for both equine species. These figures, in conjunction with data on reported sales and purchases, indicate that the equine populations in The Gambia are not presently self-sustaining. The economic implications of low foaling and high mortality rates are explored. Three scenarios to make the equine populations self-sustaining by increasing foaling and/or decreasing mortality are presented.

Introduction

Equines have been present in The Gambia for some time; for example the 1909 livestock census reported national populations of over 1,500 horses and 4,000 donkeys (Colonial Secretary, 1909). However, apart from an occasional census, sample survey, or informal observation, there has been little quantitative information on their numbers, use, management, mortality or reproductive performance.

There are, nonetheless, a number of widespread beliefs about equines in The Gambia. This "common knowledge" might be summarized as follows: in the past the use of equines was limited by the disease trypanoso-

miasis; horses and donkeys were relatively expensive and were not expected to survive over long periods, much less reproduce. While the tsetse challenge has declined in recent years as a result of lower rainfall, it is believed that large numbers of equines are still imported from neighbouring countries, and that the sex (predominately male), age and condition of these imported animals may help explain the presumably poor reproductive performance of the country's horses and donkeys.

Equines, and particularly donkeys, are thought to have rapidly increased in popularity: Starkey (1986) concluded that "during the period 1965 to 1985, donkeys changed from being of minor importance to their present status as the dominant draft animal in The Gambia." The extent and rapidity of this change is illustrated by the fact that in their wide ranging and highly detailed study of Gambian agriculture between 1972 and 1975, Dunsmore *et al.*, (1976) who put significant emphasis on ox cultivation, make only passing reference to equines. The 1987/88 national draft animal populations were estimated at 13,000 horses, 28,000 donkeys and 20,000 oxen (PPMU/NASS, unpublished data).

The mortality and foaling of equines were identified as possible problem areas during a rapid reconnaissance survey carried out in 1986 by the Animal Traction Research Taskforce of the Ministry of Agriculture (Cham *et al.*, 1987). This present survey was carried out as an activity of this Animal Traction Taskforce. The objective of the survey was to develop quantitative information concerning the

¹Department of Animal Health and Production, Abuko, The Gambia.

²Planning Programming and Monitoring Unit, Banjul, The Gambia.

³Department of Agriculture, Cape St. Mary, The Gambia.

population dynamics of horses and donkeys throughout The Gambia, including sex ratios, mortality and foaling rates.

Materials and methods

A questionnaire was developed to estimate populations of horses and donkeys, by age and sex, that were present in December 1987 and a year earlier in December 1986. In addition, information on the number of births, deaths, purchases, sales and other exchanges during the 12 month period between December 1986 and December 1987 was collected.

The survey utilised the national sample frame developed by the Planning, Programming and Monitoring Unit (PPMU) of the Ministry of Agriculture for its National Agricultural Sample Survey (NASS). This frame, which uses the *Dabada* (a Mandinka word describing a sub-division of a compound) as the basic sampling unit, divides The Gambia into six divisions comprising 36 districts. Villages in each district are stratified by size (small, medium and large), with two villages being randomly selected from each strata. Three randomly selected *Dabadas* are sampled in each village, giving a total of 18 *Dabadas* per district or 648 *Dabadas* over the entire country. The PPMU/NASS sample frame was designed to enumerate approximately 2% of all *Dabadas* in The Gambia.

Immediately before the survey, PPMU field supervisors and enumerators were introduced to the objectives of the survey and the questionnaire form. The survey was conducted during the first three weeks of December, 1987.

The questionnaire sought to determine the number, sex and age of horses and donkeys present in each *Dabada* in December 1986 and December 1987. This is the time immediately following the harvest of groundnuts, a major event in the agricultural calendar, which was used to provide a convenient reference point for the respondents. All questionnaires were completed based on the recall of

the *Dabada* head: no animals were actually counted by the field staff. Similarly, the classification of animals as adults or foals was based solely on the judgement of the respondents. In addition, information on all births, deaths, purchases, sales and other exchanges involving equines during the 12 month period was gathered.

Foaling and mortality rates were calculated on a district, division and national level as:

$$F.R. = \frac{\text{Total foals born}}{0.5 (AF86 + AF87)} \times 100$$

where:

- F.R. = Foaling rate
- Foals born = No. born, 12/86 to 12/87
- AF86 = adult females, 12/86
- AF87 = adult females, 12/87

$$M.R. = \frac{\text{Total died}}{\text{Pop86} + \text{Purchases} + \text{Births} - \text{Sales}} \times 100$$

where:

- M.R. = Mortality rate
- Total died = No. died, 12/86 to 12/87
- Pop86 = Total population, 12/86
- Purchases = No. purchased, 12/86 to 12/87
- Births = No. born, 12/86 to 12/87
- Sales = No. sold, 12/86 to 12/87

$$F.M. = \frac{\text{Total foals died}}{\text{Foals86} + \text{Purchases} + \text{Births} - \text{Sales}} \times 100$$

where:

- F.M. = Foal mortality rate
- Foals died = No. died, 12/86 to 12/87
- Foals 86 = Foal population, 12/86
- Births = Foals born, 12/86 to 12/87
- Purchases = Foals purchased, 12/86 to 12/87
- Sales = Foals sold, 12/86 to 12/87

Results

The reported population of equines in all sample *Dabadas* in December 1987 was 241 horses and 541 donkeys (Table 1). Overall, 23% of *Dabadas* reported having horses while 52% reported donkeys. The average number of horses per *Dabada* with horses ranged from 1.0 in Lower River to 1.8 in Upper River,

Table 1: 1987 national equine survey in The Gambia

Division	Districts (no)	<i>Dabadas</i> sampled (no)	Horses (no)	Donkeys (no)	Percentage of <i>Dabadas</i> with	
					Horses (%)	Donkeys (%)
Western	8	144	31	65	13	32
North Bank	7	125	73	99	38	54
Lower River	6	108	4	114	4	62
McCarthy Isl. (N)	5	89	44	73	33	56
McCarthy Isl. (S)	5	89	25	105	16	53
Upper River	5	87	64	85	41	64
The Gambia	36	642	241	541	23	52

Reported populations for December 1987

Table 2: Ratio of adult females to adult males

Division	Horses	Donkeys
Western	0.8	1.0
North Bank	0.9	0.8
Lower River	0.5	1.1
McCarthy Isl. (N)	0.9	1.3
McCarthy Isl. (S)	0.8	1.5
Upper River	1.5	1.2
The Gambia	1.0	1.1

Table 3: Foaling rates of horses and donkeys (% per annum)

Division	Horses	Donkeys
Western	60	42
North Bank	30	27
Lower River	0	31
McCarthy Isl. (N)	17	26
McCarthy Isl. (S)	21	30
Upper River	14	22
The Gambia	24	29

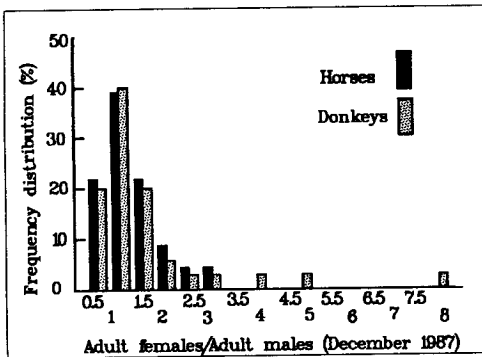


Fig. 1: Frequency distribution (percentage of all districts) of adult sex ratios for horses and donkeys.

while the number of donkeys per *Dabada* with donkeys ranged from 1.4 in Western to 2.2 in McCarthy Island (S).

The number of adult female horses per adult male ranged from 0.8 in Western, McCarthy Island (S) and McCarthy Island (N) to 1.5 in Upper River, and averaged 1.0 for The Gambia as a whole (Table 2). Adult female donkeys per adult male ranged from 0.8 in North Bank to 1.5 in McCarthy Island (S), and averaged 1.1 over the entire country. The frequency distributions of the number of adult females per adult male computed by district are shown in Figure 1. The approximately equal proportion of adult females and adult males in the December 1987 population is also reflected in the ratio of adult females and adult males purchased, which, on a national basis, was 1:1 for both horses and donkeys.

Foaling rates for horses ranged from 0% in Lower River to 60% in Western, and averaged 24% over the entire country (Table 3). Foaling rates for donkeys were generally higher than those of horses, ranging from 22% in Upper River to 42% in Western, and averaging 29% overall.

Overall mortality rates for horses ranged from 14% in McCarthy Island (S) to 67% in Lower River, and averaged 27% in The Gambia as a whole (Table 4). Similarly, mortality rates for donkeys ranged from 16% in Western to 33% in Lower River, and averaged 27% nationally. The mortality rates for foals were slightly higher than those of the population as a

Table 4. Mortality rates of horses and donkeys (% per annum)

Division	Horses	Donkeys
Western	24	16
North Bank	25	23
Lower River	67	33
McCarthy Isl. (N)	19	30
McCarthy Isl. (S)	14	26
Upper River	33	26
The Gambia	27	27

whole, averaging 35% for horse foals and 31% for donkey foals.

Discussion

Variation in mortality and foaling rates must be interpreted with caution, particularly at the district level, because the samples often had small numbers of animals. This is especially true with horses, as illustrated by the 0% foaling rate in Lower River, which was based on an adult female population of only three. With such small numbers of animals the distributions of district level mortality and foaling rates are skewed toward very high and very low values, as can be seen in Fig. 2 for mortality rates. Nevertheless, the divisional and national estimates of mortality and foaling rates, which are generally based on larger numbers, are assumed to be accurate estimates of equine performance over the survey period.

Fig. 2: Frequency distribution (percentage of those districts with horses and donkeys) of mortality rates for horses and donkeys.

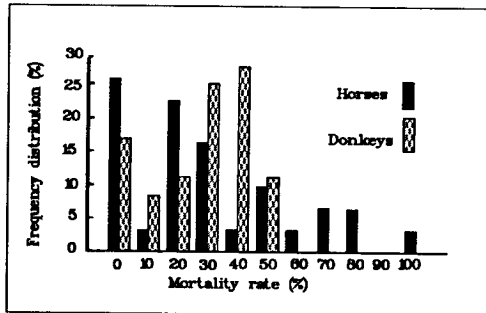


Table 5: Reported changes in equine populations between December 1986 and December 1987

	% of population in Dec. 1986	
	Horses	Donkeys
Total population Dec. 86	100 (259)	100 (624)
Births	+10	+12
Purchases	+21	+17
Sub-total	+31	+29
Deaths	-34	-32
Sales	-4	-8
Sub-total	-38	-40
Total population Dec. 87	93%	87%

Results from the survey indicate that during the year between December 1986 and December 1987 the populations of horses and donkeys in the sample *Dabadas* decreased by 7% and 13%, respectively (Table 5). In the face of what appear to be high mortality and low foaling rates, a significant number of equines were purchased. Without these purchases the populations of horses and donkeys would have decreased by approximately 24% and 20%, respectively. (This was calculated on the basis of "net purchase", which is defined as total purchases minus total sales, and is assumed to represent the number of animals "imported" into The Gambia.)

Since the survey covered only a single year it is impossible to judge if mortality and foaling rates such as these are typical. However, even if the survey tended to overestimate mortality and underestimate foaling, it is still apparent that the equine populations within The Gambia are capable of supporting little if any internal growth.

In a study of 365 donkeys in Mali, Wilson and Wagenaar (1982) estimated the foaling rate at 40-45%. In his 1978 study on 449 donkeys in Darfur, Sudan, Wilson (1978) reported a sex ratio of 1:1. He classified 35% of the popula-

Table 6: Estimated annual replacement costs for equines in The Gambia

	Horses	Donkeys	Total
Estimated population	13 000	28 000	41 000
Number of net purchases ^a	2 210	2 520	4 730
Cost per animal (D) ^b	1 200	300	
Total cost (Dx1000)	2 652	756	3 408
Total cost (\$x1000)	408	116	524

a) Net purchases = total purchases minus total sales

b) D = Dalasis = US\$0.15

tion as "breeding females" (over two years old judged on their teeth) and estimated the foaling rate at 65% - 70%. Lhoste (1983) reported that in the Sine Saloum region of Senegal, the percentage of adult female horses increased from 27% to 51% between 1973 and 1981. In the light of the common observation that there were until recently few female equines in The Gambia, it would appear that in the last few years the Gambian equine populations have gone through a structural transformation similar to that reported in Senegal.

The survey provided few direct insights into factors that might affect mortality and foaling. Historically, trypanosomiasis has been considered a major health problem of equines in The Gambia. Relatively recent changes in rainfall, and continued destruction of tsetse habitat due to expanded agricultural activities are assumed to have allowed the spread and expanded use of equines. However, there may still be a sufficient tsetse challenge to cause mortality, or to adversely affect reproductive performance through chronic conditions. Other possible causes of mortality might include African horse sickness and lymphangitis.

Since horses and donkeys are often fed during the dry season with groundnut hay (a feed of reasonable quality) which is sometimes supplemented with millet or sorghum grain, it seems unlikely that poor nutrition would be a major factor related to either mortality of foaling.

Possible factors affecting foaling can be classified as either biological or management related. While the number of adult females per male, as shown in Table 2, suggests that there should be more than sufficient numbers of males for breeding purposes, the fact that

equines are often owned and housed singly may prevent successful breeding. It is also possible that under some circumstances breeding is actively discouraged, since pregnancy is thought to necessitate some modification of work patterns.

There are important economic implications of high equine mortality and low foaling rates, and the resulting high level of purchases (Table 6). If national populations of 13,000 horses and 28,000 donkeys are assumed, the cost of "net purchases" during the survey period would have been 3.4 million Dalasis (US\$524,300), or approximately 297 Dalasis per *Dabada* with horses and 38 Dalasis per *Dabada* with donkeys. It is important to note that this calculation does not allow for any growth in the population. If the foaling and mortality rates estimated from this survey are typical, it is clear that the dramatic increase in the use of equines over the last 15 years must have necessitated a very substantial cash outlay. It is noteworthy that during this period there have been no formal credit programmes geared to the purchase of equine draft animals. Thus, Gambian farmers appear to be using large amounts of cash, or perhaps going into debt, in order just to maintain their present number of equines. It is clear that reductions in mortality and increased foaling could have profound effects on cash flow and wealth among farmers using draft equines. It could also reduce the current high level of risk associated with equine ownership, and thereby make animal draft power more accessible to poorer *Dabadas*.

Table 7: Three possible scenarios to eliminate net purchases by increasing foaling rates and/or decreasing mortality rates

Scenario	Horses		Donkeys	
	Change ¹ (%)	New rate ² (%)	Change ¹ (%)	New rate ² (%)
1. Decreasing mortality	-35	18 (27)	-30	19 (27)
2. Increasing foaling	+170	65 (24)	+75	50 (29)
3. Decreasing mortality	-18	22	-15	23
and increasing foaling	+85	44	+38	40

¹ Change relative to current rate. ² Current mortality and foaling rates in parenthesis

Three possible scenarios for making the equine populations self-sustaining, and thus eliminating the need for importations, are presented in Table 7. Scenarios 1 and 2 rely on changing either mortality or foaling rate, while scenario 3 assumes changes in both foaling and mortality. In Scenario 3 it is assumed that changes in foaling and mortality will contribute equally to overcoming the deficit. It is evident that the need for the current level of "net purchases" could be eliminated with relatively smaller changes in mortality than foaling rate.

Conclusion

Further research is needed to determine the key factors affecting equine mortality and reproductive performance, and to identify and evaluate cost-effective interventions. Specifically, sample populations of horses and donkeys in districts and divisions with high mortality rates should initially be screened for the presence of trypanosomes, and then for signs of other diseases. In relation to foaling, perhaps the most important immediate task is to determine the role of current management practices by case studies of equine owners who have or have not successfully bred their animals. If management does not appear to be a major factor affecting reproductive performance, other factors such as disease, environmental or nutritional stress should be explored.

One immediate research and development goal might be to decrease mortality and/or increase foaling so that the Gambia's equine

populations become self-sustaining. Table 6 provides quantitative estimates of the changes in mortality and foaling needed to achieve this goal, while Table 7 provides information against which the cost of various interventions could be evaluated.

Résumé

En décembre 1987, une enquête nationale portant sur 642 Dabadas a été menée en Gambie pour déterminer les taux de mortalité et de poulainage des chevaux et des ânes. Les taux de poulainage ont été estimés à 24% pour les chevaux et 29% pour les ânes. Le taux de mortalité de 27% est commun aux deux espèces. Ces chiffres, en corrélation avec les données enregistrées pour les achats et les ventes, indiquent qu'actuellement en Gambie le cheptel équin ne suffit pas à sa reproduction. Les conséquences économiques de cette situation sont actuellement étudiées. Trois stratégies sont envisagées pour accroître le taux de poulainage et/ou réduire le taux de mortalité.

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Title photograph (opposite)
Young N'Dama oxen being trained in Sierra Leone
(Photo: Paul Starkey)