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EFFECTS OF FEED SUPPLEMENTATION AND HELMINTH CONTROL ON PRODUCTIVITY OF BUNAJI CATTLE UNDER AGROPASTORAL MANAGEMENT SYSTEM

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Target Audience: Smallholder dairy farmers, animal nutritionists, extension agents

ABSTRACT

The effects of dry season supplementation with groundnut haulms and helminth control on the performance of Bunaji cattle grazing natural range were studied. A total of 144 cow-calf pairs in 24 agropastoral herds were used in the study. The treatment combinations were T1 (no supplementary feeding, no deworming), T1 (supplementary feeding of cows only), T3 (Deworming only of cow-calf pairs) and T4 (supplementary feeding of cow only and deworming of cow-calf pairs.) The supplement was fed at 3.0kg/head/day while the animals were dewormed 3 times during the 16 weeks trial period.

Supplementation of cows with groundnut haulms significantly increased (P<0.05) milk offtake of cows and growth rates of suckling calves. Daily milk offtake per cow for the T1, T2, T3 and T4 treatments averaged 0.79, 1.04, 0.76 and 1.25kg respectively. Calf growth rate averaged 100.1, 163.0, 155.7 and 217g/d for T1, T2, T3 and T4 treatments respectively. Deworming with anthelmintic drug increased (P<0.05) calf growth rates and reduced (P<0.05) mortality of calves. Calf mortality averaged 13.8, 12.5, 6.8 and 9.1% for T1, T2, T3 and T4 treatments respectively. Net economic benefit was higher in T3 and T4 than in T1 and T2 treatment groups. The results indicate that adoption of joint forage legume supplementation and helminth control would increase milk offtake, calf growth and income of smallholder dairy producers.

Keywords: Groundnut haulms, deworming, milk offtake, calf growth, economic benefit, Bunaji cattle

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DESCRIPTION OF PROBLEM

Domestic milk production in Nigeria is largely by smallholder agropastoral producers who often settle around major cities and sell their dairy products in urban centres. Although the demand for dairy products in the country is high (1), and estimated cattle population is also high (2), milk output from smallholder production systems is low. Inadequate and poor quality feed, especially during the dry season and high incidence of gastrointestinal parasites have been identified as major constraints limiting smallholder milk production (3).

Range vegetation is the major feed resource for agropastoral herds. The quality of range vegetation fluctuates due to seasonal pattern of forage growth. The grasses which are mostly annuals, are nutritious at the beginning of the rains but with the onset of the dry season there is rapid decline in their nutrient contents, especially nitrogen and phosphorus. It is therefore generally recognised that, for cattle dependent on range forages, supplementary feeding is essential during the dry season. However, because of the high cost of the conventional concentrate feeds, agropastoral cattle are usually not supplemented in the dry season. Multipurpose legumes are therefore being increasingly advocated for as possible alternatives to expensive protein supplements.

Gastrointestinal parasites pose serious problems in livestock production in Nigeria especially in the rainy season. During this period, gastrointestinal worm burdens are generally high (4). Helminth infection rates are usually lower in the dry season as the prolonged dry period renders the pastures helminthologically sterile (5). Although helminth infection has been known to cause morbidity and mortality among calves (6), its effect on milk production has not been adequately documented.

This study was therefore designed to (1) examine the effects of dry season supplementation with groundnut haulms and helminth control on the productivity of Bunaji cattle under agropastoral production system and (2) determine the economic benefits of feed supplementation and helminth control in agropastoral herds.

MATERIALS AND METHODS

Study area

The study was conducted on-farm among agropastoralists settled in peripheries of Zaria urban centre. Zaria lies between latitude 10 and 11^0 North and longitude 7 and 8^0 East and situated in the northern boundary of the sub-humid zone. The natural vegetation is Northern Guinea savanna. Mean annual rainfall in the area is 1100mm, lasting from May to October. Mean daily temperatures during the wet season is 25^0C with mean relative

humidity of 72%. The dry season lasts from November to April with mean daily temperatures ranging from 14 to 36^{0}C and mean relative humidity of 20 - 37%.

Milk production in the study area is based largely on indigenous Bunaji cattle breed kept by Fulani herdsmen who grow food crops in addition to their primary cattle herding activities. Food crops commonly grown include sorghum, millet, maize, cowpea, groundnut, rice, pepper and tomatoes. Cattle are herded to the fields in the morning after milking to graze natural forages and crop residues. They are returned in the evening and corralled during the night in open field, near the homestead. Unweaned calves are tied by ropes to separate them from their dams. Cows are partially milked once a day, in the morning, the remainder of the milk being suckled by the calves.

Experimental animals, design and management

A total of 144 lactating Bunaji cows in 24 herds were used in the study. The herds were located in 4 groups of agropastoral settlements, with each group having 6 herds and each herd having a minimum of 6 lactating cows. The cows were required to have been in lactation for not longer than 4 months. The groups were randomly assigned to 4 treatments as follows:

Treatment 1 (T1)	No supplementary feeding, no deworming (control)
Treatment 2 (T2)	Supplementary feeding of cows only
Treatment 3 (T3)	Deworming only of cow-calf pairs
Treatment 4 (T4)	Supplementary feeding of cows only and deworming of cow-calf pairs

All the animals were grazed on natural range after milking in the morning. Cows in treatments 2 (T2) and 4 (T4) were offered groundnut haulms supplement after milking in the morning and prior to grazing. They were tethered and fed individually at the rate of 3.0kg/head/day. The groundnut haulms supplement used was purchased from market.

Cow-calf pairs in treatments 3 (T3) and 4 (T4) were dewormed with Banminth-F (Pfizer), a suspension of 2.3% w/v morantel citrate monohydrate and 2.0% w/v oxyclozanide. The anthelmintic was administered orally at 1ml per 4kg liveweight. The animals were dewormed at the beginning, middle and end of the study.

Milk offtake (quantity of milk extracted for human consumption) was measured weekly, using graduated plastic measuring cylinders. Milk samples were taken monthly for analysis. Liveweights of cows and calves were measured monthly, using Dalton weigh band. Faecal samples were taken per rectum at monthly intervals from each animals for helminth identification and worm egg counts. The experiment commenced in February, 1997 and lasted for 16 weeks.

Laboratory analysis

Dry matter in feed samples was determined by oven drying at 100°C. Ash was determined by heating in a muffle furnace at 550°C for 5 hours (7). Nitrogen in feed and milk samples was determined by the Kjeldahl procedure (7). Feed sample were analyzed for neutral detergent fibre (NDF) and acid detergent fibre (ADF) by the procedures of Goering and Van Soest (8). Milk fat was determined by the Gerber method (9). Total solid in milk was determined by oven drying at 70 - 80°C. Faecal samples were examined for helminth eggs and coccidial oocysts using the modified McMaster technique (10). Coccidia oocysts were recorded as + (1-10 oocysts per microscope field), ++ (10-20 oocysts per field) or +++ (20-40 oocysts per field).

Cost-benefit analysis

Cost-benefit analysis was undertaken to determine the profitability of the treatment. The purchased inputs used in the analysis were supplementary feed and dewormer drug while the output used were milk offtake for human consumption and calf growth. The inputs were costed at prevailing market prices and the outputs - milk and meat were priced, using the producers' prices.

Data analysis

The data were analyzed considering the herd as an experimental unit. The model used was: Response = Mean + Treatment + Herd (Treatment) + Error Term.

Data on worm egg counts were log transformed after adding 1 to all values so as to compensate for the zero egg count. Statistical analysis was by least squares analysis of variance using PROC GLM Type II sums of squares (11).

RESULTS

The groundnut haulms supplement used was found to contain on average 91.3% dry matter (DM) with crude protein, 11.60%, NDF, 48.02%, ADF, 39.72% and ash, 6.37%, as presented in Table 1.

Table 1: Chemical constituents of groundnut haulms

Component	% on DM basis
Crude protein	11.60
Neutral detergent fibre	48.02
Acid detergent fibre	39.72
Ash	6.39

The percentages of faecal samples from cattle with positive worm egg counts are shown in Table 2. Helminths and coccidia accounted for 47.0 and 44.6% of the gastrointestinal parasites respectively. Among the helminths, *Trichostrongyles* were by far the most prevalent (37.9%). Larval culture showed that about 70% of the *Trichostrongyle* worm burdens were *Haemonchus*.

Table 2: Percentages of faecal samples from cattle with helminth eggs and coccidia oocysts

	% positive for worm eggs+
Coccidia	44.6
Helminth:	
Trichostrongyles	37.9
Strongyloides	6.3
Toxocara	2.8
Others	0.4

+ Number of faecal samples = 362

The prevalence of *Strongyloides* and *Toxocara* spp were low, averaging 6.3 and 2.8% respectively. *Strongyloides* and *Toxocara* infection occurred mostly in calves. Average monthly percentages of animals infected with *Trichostrongyles* are shown in Figure 1. The percentage of cattle infested

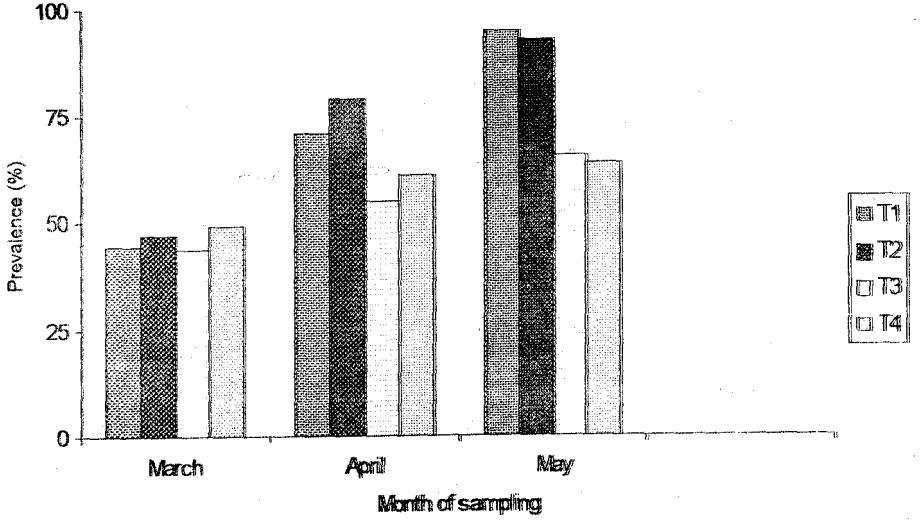

Figure 1: Average monthly percentages of animals infested with Trichostrongyles

with *Trichostrongyles* increased from 45.7% in March to 93.5% in May for undewormed groups (T1, T2). Deworming with Banminth-F reduced Trichostrongyle worm burdens. Average monthly prevalence of Trichostrongyles infection in the dewormed groups (T3, T4) varied from 46.4% in March to 64.4% of animals infected in May. Most of the animals however, shed few eggs, ranging from an average of about 200 egg in March to about 400 egg in May for both undewormed and dewormed groups.

Intake of groundnut haulms supplement per cow averaged 3.0kg for all the treatment groups. Significant differences ($P<0.05$) in daily milk offtake occurred among experimental groups (Table 3). Average daily milk offtakes per cow for the T1 (control), T2, T3 and T4 treatments amounted to 0.77, 1.04, 0.76 and 1.25kg respectively. Milk protein, fat and total solids averaged 3.6, 4.2 and 12.7% respectively with no significant differences due to treatment (Table 3).

Table 3: Effect of dry season supplementation with groundnut haulms and helminth control on milk offtake, milk composition, cow body weight gain, calf growth rate, calf mortality and net economic benefit in agropastoral herds

Parameter	Treatment				
	T1	T2	T3	T4	AV.SE
Milk offtake (kg/d)	0.77^{b}	1.04^{a}	0.76^{b}	1.25^{a}	0.96
Protein (%)	3.6	3.7	3.5	3.6	0.09
Fat (%)	4.3	4.2	4.2	4.3	0.08
Total solids (%)	12.7	13.1	12.9	12.4	0.44
Solids-not-fat (%)	8.4	8.8	8.6	8.1	0.06
Ash (%)	0.7	0.7	0.7	0.6	0.01
Cow body weight gain (g/d)	52.9	74.4	60.6	70.8	1.18
Calf growth rate (g/d)	100.1^{c}	163.0^{b}	155.7^{b}	217.5^{a}	1.65
Calf mortality (%)	13.8^{a}	12.5^{a}	6.8^{b}	9.1^{b}	1.40
Cost of Inputs* (₦)	0.0	2241.1	180.0	2421.1	-
Value of Outputs** (₦)	4354.8	6097.6	4772.8	7555.4	-
Net Benefit (₦)	4354.8	3856.5	4592.8	5133.3	-

a,b,c Means on the same row with different superscripts differ significantly ($P<0.05$)

* Input prices (₦): Groundnut haulms, 6.67Kg^{-1}
Dewormer drug, 1200.00L^{-1}

** Output prices (₦): Fresh milk, 40.0Kg^{-1}
Liveweight of cattle, 80.0Kg^{-1}

There was no significant difference ($P>0.05$) between the treatment groups in mean liveweight gain of cows (Table 3). However, calf growth rate was significantly ($P<0.05$) affected by experimental treatments. Average calf growth rate for T1, T2, T3 and T4 treatments were 100.1, 163.0, 153.5 and 217.5 g/d respectively (Table 3). Calf mortality calculated up to 12 months of age differed significantly ($P<0.05$), averaging 13.8, 12.5, 6.8 and 9.1% for T1 (control), T2, T3 and T4 treatments respectively.

The cost-benefit analysis based on milk offtake for human consumption and calf growth is shown in Table 3. The net economic benefit of a cow given a daily supplement of 3.0kg groundnut haulms (T2) over a non-supplemented, non-dewormed (T1) cow was lower by ₦498.30. However, net benefit of a dewormed only group (T3) and a supplemented and dewormed group (T4) was higher by ₦238.0 and ₦778.5 respectively compared to the non-supplemented and non-dewormed (control) group.

DISCUSSION

Although the percentages of animals infested with *Trichostrongyle* helminth were generally high, mean *Trichostrongyle* worm burden was lower than the 600 eggs per gram of faeces considered to be pathogenic (12). Monthly prevalence was higher at the end of the study period which coincides with the beginning of the wet season. This agrees with earlier reports (4) that helminth worm burdens were highest during the wet season. Coccidia infection rates were high in all the treatment groups. This is expected as the dewormer drug used was specific for control of helminth infection. Although adult cattle tend to develop some immunity to coccidiosis, high coccidia infection rates in calves are known to cause production losses (13). Thus, in addition to helminth control, it may be necessary to incorporate treatment against coccidiosis in agropastoral herd health management.

Supplementation of Bunaji cows in the dry season with 3.0kg of groundnut haulms increased milk offtake for human consumption. Among the supplemented groups, average daily milk offtake was higher in cows fed supplement and dewormed than in cows fed supplement only. The values of milk offtake obtained in this study are similar to those reported for Bunaji cows grazing natural range and receiving supplements of cottonseed cake (14) or *Lablab purpureus* hay (15).

Supplementary feeding of groundnut haulms to cows improved growth rates of suckling calves compared to the non-supplemented control group. This is attributable to increased milk consumption by calves arising from the higher milk output by their supplemented dams. In partial milking system, approximately 60% of the milk produced is consumed by the calf

(16). Significant increases in growth rates of calves suckling supplemented cows have also been reported in other studies on traditional cattle production system (17). Similarly, anthelmintic treatment had significant effect, on calf growth rate and mortality. Compared to the non-dewormed control group, mean daily calf growth rate was increased in the dewormed only group and the dewormed and supplemented group. Calf mortality in combined groups treated with anthelmintic averaged 8.0% compared to 13.2% in untreated groups. The higher calf mortality observed in the untreated groups may be due to *Strongyloides* and *Toxocara* helminth which infections occurred mostly in calves. Ikeme (6) reported death of Bunaji calves due to naturally acquired infections of *Strongyloides* and *Toxocara*.

The results showed a higher net economic benefit in the group dewormed and fed supplement of purchased groundnut haulms compared to the non-dewormed and non-supplemented control group. The ratio of the value of milk offtake and calf growth rate over the cost of the supplementary feed was approximately 3:1. The margin of milk value over feed cost would be higher if the farmer were to produce his own groundnut haulms. Agyemang *et al* (18) reported 5 to 8 fold margin of milk yield value over feed cost when home-grown forage legumes were used to supplement Bunaji cows.

CONCLUSIONS AND APPLICATIONS

1. Dry season supplementation with groundnut haulms of cattle grazing natural range increased milk offtake and growth rates of suckling calves
2. Deworming of cattle with anthelmintic drug reduced helminth infection, improved growth rate and reduced mortality of suckling calves
3. Joint control of helminth infection and supplementation with groundnut haulms led to higher milk offtake and calf growth rates than feed supplementation or helminth control alone.
4. Cost-benefit analysis based on milk offtake and calf growth gave higher net economic benefit in dewormed and supplemented group over the non-dewormed, non-supplemented control group.
5. The results indicate that adoption of joint forage legume supplementation and helminth control would increase milk offtake, calf growth and income of smallholder dairy farmers.

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A RETROSPECTIVE (1987-1996) STUDY AND SOCIO-ECONOMIC IMPLICATIONS OF *SLAUGHTERING* PREGNANT COWS AT YOLA NIGERIA

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Target Audience: Veterinarian, animal scientists, farmers, government agencies and policy makers, butchers NGOs

ABSTRACT

Records available at the Yola Municipal abattoir in Adamawa State showed that, between 1987 and 1996, 85491 cattle were slaughtered in the abattoir. Of this number, 49124 (57.46%) were females. The incidence of pregnancy among the slaughtered cows was 8.23% as a total of 4043 fetuses were recovered during the period. During a 10-day prospective study 44 fetuses were recovered. 25 (56.8%) of the fetus were female. 18 (40.9%) of the fetuses were in the first trimester while 13 each were in the 2nd and 3rd trimester stages of pregnancy respectively. Applying these ratios to the 4043 fetuses recorded over the 10 years, 59% (2389) were in the 2nd and 3rd trimester stages of pregnancy when diagnosis per rectum could have saved them. Slaughtering pregnant cows knowingly or inadvertently results in economic loss to the country. Preventive measures are recommended.

Keywords: Abattoir survey fetal wastage, Yola

INTRODUCTION

Abattoir surveys are usually undertaken for a variety of reasons including estimation of economic and animal demographic parameters. Such parameters include number of animals presented for slaughter at the abattoir over a specified period of time, incidence and extent of wastage arising from carcass or viscera condemnation and indeed pregnancy and fetal wastage (1,2,3,4,5). Abattoir studies also provide information on the magnitude of the animal protein deficits in the average Nigerian's diet. Information on the general status of the National Herd can also be obtained from such surveys (1,3).

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Although abattoir surveys had been undertaken in some parts of the country previously (3,5) none had been reported from Adamawa State which is a major portal in the cattle trade route from Chad, Cameroons and countries further east such as Sudan and Ethiopia. As many of these cattle invariably pass through the control posts at Yola, the State capital, it was thought that records at its abattoir would give a fairly reliable indication of the state of the cattle trade as it applies to the North-eastern part of the country (3). This study was there designed and undertaken to not only provide this information but also assess the degree of fetal wastage at the Yola abattoir.

MATERIALS AND METHODS

Records in the Yola modern abattoir 1987 to 1996 were checked for information on: -

(i) The total number of cattle slaughtered. (TCS)
(ii) The sexual composition of the TCS.
(iii) The number of fetuses recovered from slaughtered pregnant cows.

This information was sorted on daily, monthly and annual basis. Further analysis yielded monthly and annual means and the corresponding standard deviations. Prospective study was also undertaken by visiting the slaughter slabs in the abattoir for 10 consecutive days during which fetuses from slaughtered pregnant cows were recovered from the butchers. The fetuses were identified by age and sex using standard parameters (6,7,8,9) The economic consequences of slaughtering pregnant animals, whether willfully or inadvertently, were estimated according to the procedures of Zakari et al (1) and Wilson (10). Animal protein supply derivable from the slaughtered cattle was estimated by a slight modification of the methods of Williamson and Payne (11). The average live weight of a bull was taken as 175 kg while that of a non-pregnant cow was taken as 150 kg. A mean dressing percentage of 45 % was also adopted.

RESULTS AND DISCUSSION

Between 1987 – 1996 a total of 85491 cattle (TCS) were slaughtered at the Yola modern abattoir. Of this number, 49124 (57.46%) were females while 36367 were males (Table I). During that period 4043 fetuses were recovered showing a pregnancy rate of 8.23% in the females.

There was a gradual fall in the TCS from 11154 in 1987 to 5824 in 1996. Correspondingly, the number of female cattle slaughtered fell from 7886 (70.75% TCS) in 1987 to 2404 (or 41.3%) in 1996. However, the highest TCS was in 1991 and the highest number of females was also slaughtered in 1991. But as the TCS fell from 1993 so did the female component of it (Table 1).

Paradoxically, as the proportion of females in the TCS fell the number of fetuses recovered increased, in some instances rather significantly ($P<0.05$). For instance in 1987, 393 fetuses (4.98%) were recovered from a total of 7886 cows slaughtered while the corresponding figures for 1992 and 1996 respectively were 499 (9.16%) and 615 (25.58%) Table 1). In.1991, when both TCS and the proportion of the female component of it were highest, only 211 fetuses (2.53%) were recovered.

Table 1: Annual Record of Cattle Slaughtered at Yola Modern Abattoir between 1987 – 1996.

Yr.	Total cattle slaughtered (TCS)	Total Females slaughtered		Fetuses condemned		
		Number	As % of TCS	Number	As % of Females	As % of TCS
87	11154	7886	70.75	393	4.98	3.52
88	10147	6293	62	236	3.75	2.32
89	8784	5368	61.1	204	3.80	2.32
90	10112	6093	60.3	371	6.09	3.67
91	13314	8332	62.6	211	2.53	1.58
92	9154	5449	59.5	499	9.16	5.45
93	6515	2757	42.3	371	13.45	5.69
94	5656	2315	40.1	570	24.62	10.08
95	4831	2227	46.1	573	25.72	11.86
96	5824	2404	41.3	615	25.58	10.56
Total	85491	49124	57.46	4043	8.23	4.7

Table 2 shows the monthly distribution of the TCS between 1987-1996.There were marginal increases in the months of November to January but not significantly different from the other months and affected mainly the male components of the TCS. The total number of females slaughtered each month was always higher than the corresponding number of males. The data on mean monthly fetal recovery shows that the lowest numbers of fetuses (284,280,244) were recovered in November, December and January respectively. But between February-October relatively higher numbers of fetuses were recovered each month.

Table 3 shows the distribution of the 44 fetuses recovered during the 10 days prospective study, 25 (56.8%) of the fetuses were females while 19 (43.2%) were males. 18 (40.9%) were aged between 1-3 months, 13 (29.5%) were aged 4-6 months and the remaining 13 were aged 7 months and above.

Table 4 shows the estimation of potential losses arising from the slaughter of pregnant cows at the Yola abattoir. The estimations were based on the number of fetuses (4043) recovered during the 10-year period of retrospective study. The sex and age ratios derived from Table 3 were

Table 2: Monthly Distribution of Cattle slaughter pattern at the Yola modern Abattoir between 1987 – 1996.

Month	Male (m)			Female (f)			Total for Month	% female	Fetuses		
	Total	Mean	SD	Total	Mean	SD			Total	Mean	SD
Jan	3512	351.2	132.88	5081	508.1	218.71	8593	59.13	244	24.4	16.56
Feb	2776	277.6	83.74	4599	459.9	209.92	7375	63.36	303	30.3	16.81
Mar	2523	252.3	166.43	2614	261.4	208.46	5137	50.90	421	42.1	18.97
Apr	2728	272.8	85.45	4127	412.7	244.73	6855	60.20	334	33.4	18.21
May	2778	277.8	51.65	4598	459.8	241.22	7376	62.30	504	50.4	28.93
June	3136	313.6	81.34	4765	476.5	302.67	7901	60.30	423	42.3	22.43
July	2957	295.7	102.55	4032	403.2	218.9	6989	57.70	331	33.1	17.71
Aug	2499	249.9	96.70	3319	331.9	188.6	5818	57.90	412	41.2	20.63
Sept	2920	292	166.30	3512	351.2	243.77	6432	54.60	330	33.0	19.18
Oct	2724	272.4	76.14	3387	338	180.05	6111	58.40	348	34.8	17.86
Nov	3616	361.6	127.25	5007	500.7	127.25	8623	58.10	284	28.4	21.35
Dec	3526	352.6	109.06	4464	446.4	109.06	7990	55.90	280	28.0	20.97

Table 3: Cattle Fetuses collected in Yola modern Abattoir in a 10-day prospective study.

By Sex:	Male		Female	Total
	19		25	44
By Age: (months)				
	1—3	4 –6	>7	Total
	18	13	13	44

applied to the 4043 fetuses to get the 1746 males and 2297 females; 1654 1st trimester 1194 2nd trimester and 1195 3rd trimester stage fetuses. If these fetuses had been born and properly cared for they could have been sold for about N89, 890,000.00. Other losses include 650,100kg of meat; 1,148,500kg of milk and 4,043 hides. If the female fetuses were allowed to reach breeding age 13,782 offsprings would be produced.

This study shows the extent of herd wastage resulting from the slaughter of pregnant cows. Over the years in the period under study the TCS declined steadily as did the relative proportion of the female component of it. This finding is not in agreement with that of Ogundipe and Olaifa (3) in Oyo State in south-western Nigeria over the same time period (1987 – 1996). They observed marginal increases in the proportion of female cattle

Table 4: Estimation of potential losses as a result of inadvertent slaughter of pregnant cows at Yola Modern Abattoir between 1987 – 1996.

Sources of loss	Male fetuses	Female fetuses	Total
1. Reduction in livestock population	1746	2297	4043
2. Price	1746 x N25, 000 N43,650,000.00	2297 x N20, 000 N45,940,000.00	N89, 590,000
3. Meat Wastage	(1746 x175 Kg) 305,550Kg	(2297 x150 Kg) 344550Kg	650,100Kg
*4. Hides	1746	2297	4043
5. Milk wastage	-	(2297 x 500Kg) 1148500	1148500Kg
6. Breeding potential	–	(2297 x 6)	
* Implications for loss of foreign exchange	13782		13782

slaughtered even though the TCS decreased in successive years. Zakari *et al* (1) had also observed a decrease in the TCS at the Maiduguri Metropolitan abattoir in the years following the1983 rinderpest outbreak in Borno State. These two groups of workers attributed the fall in TCS to fall in supply from their traditional sources. For Maiduguri this referred to the surrounding farms which were hardest hit by the rinderpest outbreak and for Oyo State the supply traditionally comes from the northern part of the country including Adamawa State. A decrease in Adamawa state will thus necessarily affect the receiving towns down south.

So what was responsible for the fall in TCS at Yola after 1991? and what could have been responsible for the initial highs of the half-decade 1987-1992? For the initial highs of 1987-1992 we proffer that the rebuilding of the farms devastated by the 1983 rinderpest outbreak and lifting of restriction on border trading in cattle with neighbouring countries must have rekindled enthusiasm in the cattle trade increasing and encouraging vigorous activity. However, the structural adjustment programme (SAP) of the Federal government was then just beginning to manifest its pauperizing effects on the generality of the people. By the next half decade, 1992-1996, the SAP coupled with political turmoil in the nation had a crippling effect on the cattle trade. The TCS figures for 1993, 1994 and 1995, the height of the crisis (June 12, Interim government and the years of political repression) support this explanation. Why the proportion of females in the TCS for these years fell? Farmers probably kept their cows back on the farm to multiply their stock and provide more milk for the home and market. Such needs were, very probably, not as compelling in the relatively more prosperous years of 1987-1991, when as it revenue

could be generated more easily than through livestock farming. Ironically as the proportion of females in the TCS fell, the incidence of pregnancy as indicated by fetal recovery increased rather significantly from an average of 4.23% in the first half-decade (1987-1991) to 19.7% in the second half decade (1992-1996). giving some leverage to the suggestion that more of the females were kept back for procreative purposes. Those who presented pregnant cows for slaughter must have been really hard up economically.

Also the initial high proportion of females in the TCS may have resulted from infertility or disease. The infertility was reflected in the low pregnancy rate and, although we did not inquire into the health status of the animals, Ogundipe and Olaifa (3) had earlier cited 'diseases' as one of the reasons for culling animals especially pregnant females for slaughter.

During the 10 days prospective study a total of 44 fetuses were recovered from slaughtered cows. At that rate, there would have been 132 fetuses for the month, giving a monthly average of 1320 fetuses for the 10-year period. This is significantly higher ($P<0.05$) than the monthly mean of 351 fetuses recovered during the 10-year retrospective study (Table 2). Mis - diagnosis or non-diagnosis of pregnancy and faulty record keeping had been two major reasons adduced for such disparity (2,3). Dodging or concealment of gravid uteri by unscrupulous butchers at post-mortem inspection may also contribute to such disparity (3).

Applying the sex ratio obtained in the prospective study to the retrospective data revealed that 41% of the 4043 fetuses were probably produced from first trimester- stage pregnancies, which could easily have been missed during ante-mortem inspection. The remaining 59% fell into the 2nd and 3rd trimester- stages, which should have been easily detectable. Conscious slaughter must therefore be assumed for these since, as stated earlier, most of these cows probably originated from farmsteads where herd multiplication programmes were probably in progress.

57% of the TCS were females which exhibited a pregnancy rate of 8.23%. These figures are comparatively high (1,2,3). The situation could even be more frightening if it's realized that difficult socio-economic circumstances could compel owners and butchers to desire to evade both ante-and post-mortem detection. Such practices usually lead to under reportage of pregnancy cases. The observed 8.23% pregnancy rate may be far below the true situation and this poses a great danger to the National Herd.

Although seasonal influences were not specifically investigated in this study the finding in Table 2 showed that cattle slaughter was more or less evenly spread throughout the months of the year. The marginal increases in the months of November-January cannot be said to be a response to any festival demand since the choice animal for religious observances of a majority of

the indigenes of Adamawa State is the ram. However, Ogundipe and Olaifa (3) had observed a significantly heavier slaughter during the same period in the South-west as a result of increased demand for beef during the festival season. The reason for the increases in Yola during these months is not known.

The estimated potential losses attending the slaughter of pregnant cows as shown in Table 4 are rather frightening and should be a cause for serious concern for government in a country that is lagging far behind in the provision of adequate protein of animal origin in the diet of its citizens. Given that the information on Table 4 was derived from just one abattoir, the magnitude of the wastage on a national scale becomes alarming and one cannot but join the clarion call to the Federal and State governments to act fast to halt and indeed reverse this situation.

CONCLUSION

In view of the magnitude of the losses that accrue from the slaughter of pregnant cows in our abattoirs we recommend that the Federal and State governments should act fast to halt such practice. This can be done through legislation and education. Professionals--veterinarians and animal scientists could be given specialist training in the area of pregnancy diagnosis to preclude incidents of non-detection of pregnancy even in the 1st trimester. Nomadic farmers can also be educated and encouraged not to sell off their pregnant cows for slaughter. This would, of course, mean the government exploring other ways to alleviate the distress of those in acute need.

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