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Full Length Research Paper

The influence of Season and Location on Body Condition Score and Weight of Oxen in Ginchi Watershed, Central Ethiopia

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The objective of this study was to assess the influence of season on body condition score and weight of oxen at Ginchi watershed in West Shewa Zone of Oromia Regional State, central Ethiopia. A purposive sampling technique was used to select the oxen in the study area. Data were collected and analyzed using descriptive statistics. The overall average body weight (BW) of oxen in the watershed at the end of March, end of May and end of September was 272.2±2.1, 264.2±1.9 and268±2.3 kg, respectively. The average body condition score (BCS) of oxen in the watershed were 5.6 points (M+) at the end of March, 5.3 points (M) at the end of May and 5.4 points (M) at the end of September. There was a decline and rise in average BW and BCS between different seasons of measurements. For the watershed, average BW at the end of March was significantly higher than end of May ($p<0.01$). There was a significant difference between BCS at the end of March and end of May ($P<0.05$). In land type A, BW of oxen were significantly ($P<0.05$) better in March than September and May. At land type B, average BW was highest for March ($P<0.05$) and lowest for May, September average BW being intermediate. Body condition score at watershed level was significantly higher ($P<0.05$) in March. At land type A, BCS of oxen were significantly ($P < 0.01$) better in March compared to May and September. In land type C, oxen had significantly higher average BCS at the end of March ($P<0.05$) than May and was significantly ($p < 0.05$) better in September compared to May. It can be concluded that, it is difficult to make any meaningful correlations between the feed availability and oxen BCS and BW since the magnitude of the impact of traction on the BCS and BW and the household feed allowance was not certainly known.

Keywords: Dandi, Heart Girth, Oromia, Traction, West Shewa

INTRODUCTION

Ruminants tend to loose body weight and body condition during feed shortages. However, they use their physiological response to compensate at the time of feed availability. In the tropics and subtropics, body weight and condition follows the seasonal fluctuations of feed resources as influenced by the seasonal dynamics of rainfall (Gryseels and Anderson, 1983; Solomon, 1996). Gryseels and Anderson, (1983) reported that, in the central highlands of Ethiopia, the seasonal variability in the quality and quantity of feed on offer gives rise to an annual cyclical pattern of live weight gains and losses and the pattern is affected by energy demands for work. However, the period of feed shortages varies in the different farming systems depending on the proportional share of the different feed resources (pasture and crop residues) to the total feed supply at different seasons of the year. Solomon, (1996) has reported that crossbred dairy cows managed under smallholder conditions lost body weight and body condition during the rainy season in the Selale highlands of Ethiopia, whereas many others have reported that ruminants lose weight and condition during the dry spell, but gain towards the rainy season suggesting poor quality feed over the dry season (Iwuanyanwn et al., 1992). Therefore, it is useful to

quantify the extent to which cattle are affected by nutrition, disease or other environmental factors, especially when large fluctuations in the quantity and quality of available forage occur, as they do in seasonally dry tropical and subtropical areas (Nicholson and Butterworth, 1986). Hence, across season measurements and assessments of heart girth and body condition of animals would be very good indicators of impact of seasonal feed availability on productivity.

Heart girth measurements of cattle are highly correlated to live weight than to any other single linear measurement (Tilakartane and Matsukana, 1976; Mwambaghi, 1977; Semenye, 1979). Semenye, (1979) has established a heart girth, live weight conversion table for estimating live weight of cattle from heart girth linear measurements. The conversion table is best for small East African Zebu of both large and small body frames and of traditional indigenous Boran Cattle. The result indicates the value for coefficient of correlation between heart girth measurement and live weight as 0.97 for all classes of small East African Zebu Cattle.

The nutritional plane to which an animal has been exposed over a reasonable length of time is also reflected by the extent to which fat is stored or muscle mass has diminished. This may be assessed visually and expressed as a condition score. Condition scoring provides a quick cheap and easy method of comparing herds of cattle or individual animals under differing management systems, experimental treatments, seasons or environments. The results have also practical importance for cattle productivity. Large numbers of animals can be scored at a time without the need to handle them or use weigh scales (Nicholson and Butterworth, 1986). Reed *et al*. (1986) reported a highly positive correlation between condition and resource availability (finance, management skill and grazing availability), indicating that condition scoring. With this background information, the objective of this study was to assess the influence of season on body condition score and weight of oxen at Ginchi watershed in the West Shewa Zone of Oromia Regional State, central Ethiopia.

MATERIALS AND METHODS

The Study Area

The study was conducted in Ginchi watershed, Dandi district of West Shewa Zone of the Oromia Regional State, central Ethiopia. The area is located 90 km west of Addis Ababa at an altitude ranging from 2140-2800 m above sea level, with mean annual rainfall of 1140 mm and average daily temperature of 16.3º C (Mitiku, 1987). The soils are Pellic Vertisol, Vertic Cambisol and Nitosol (Mitiku, 1986; Kamara et al.,1988)The study area was stratified into three based on altitudinal ranges viz., Land type A (2140–2200 m.a.s.l.), Land type B (> 2200 – 2400 m.a.s.l.) and Land type C (> 2400–2800). Land types A, B and C correspond to low, medium and high altitudes, respectively. The majority (57%) of the population resides in land type C, whereas 28 and 13% resides in land types A and B, respectively.

Heart Girth Measurements

Heart girth measurements of 107 matured oxen were taken at the end of the dry season before the onset of the ploughing exercise (March) and of the same but 99 oxen in May, and 81 oxen at the end of the rainy season (October, 2001). The measurements were done early in the morning before animals went out for grazing. An ordinary tape was used to measure the heart girth. The measurement was converted to weight units using heart girth-live weight conversion tables developed by Semenye, (1979) for East African Zebu Cattle. The measurement was taken from the smallest diameter running immediately behind the hump and the fore legs of an animal standing erect. The relative increases or decreases in weights of the same animals were analyzed across seasons for land types and the whole watershed.

Body condition scoring (BCS)

The same oxen were scored for their body condition during the heart girth measurements using the methodology for the Zebu Cattle condition scores ranging from 1-9 are established by subdividing the three main body conditions, viz. Fat [F], medium [M] and lean [L] according to Nicholson and Butterworth, (1986). Anatomical parts like the brisket and hump, transverse process, lumbar vertebrae, hips, ribs, the shape of the muscle mass, the hooks and pins were observed in the scoring process. The data was analyzed statistically using Statistical Package for Social Sciences (SPSS) software, version 10.0. Results were presented as mean (± SE).

RERSULTS AND DISCUSSION

Body Weight of Oxen

The overall average body weight of oxen in the watershed at the end of March, May and September was 272.2±2.1, 264.2±1.9 and268±2.3 kg, respectively (Table 1). End of March and end of May measurements were supposed to show dry season performance while end of September measurements were supposed to show wet season performance. In general, there was a decline and rise in average weight between end of March and end of September, end of May measurements being the lowest except in land type A whereas the September average

Table 1. Overall average body weight (mean ± SE) of oxen during different seasons in the Ginchi watershed (n=81)

Season	Weight
End of March	272.2±2.1[a]
End of May	264.2±1.9[c]
End of September	268±2.3[ac]

n=number of oxen, means between months within a column with different superscript letters are significantly (P<0.01) different

Table 2. Average body weight of oxen by land type

Land types	End of March	End of May	End of September
A	284.4±3.9[a]	271.9±3.2[b]	271.1±3.6[ab]
B	272.2±5.2[a]	270.5±5.0[a]	275.2±5.2[a]
C	266.6±2.5[a]	260.3±2.4[a]	265.4±3.2[a]

Means between months within a row with different superscript letters are significantly (P<0.05) different

weight was the lowest. For the whole watershed, there were significant differences between end of March and end of May regarding average weights ($p < 0.01$). However, there was no significant variation between March and September and May and September body weight of oxen. There was a moderate positive correlation (r) between average body weight and body condition score in all the three measurements viz., 0.54, 0.43 and 0.44 values for end of March, end of May and end of September, respectively.

Effect of Season on Body Weight within Locations:

At land type A, at the end of September average weight of oxen were the lowest (271.1 kg) indicating that the oxen were losing weight throughout the wet season (Table 2). Weight of oxen were significantly (P<0.05) better in March compared to September and May. The May and September average weights were not significantly different.

At land type B, average body weight was highest for March (P<0.05) and lowest for May, while September average weight being intermediate. In land type C, oxen had highest average weight (266.6 kg) at the end of March. Lowest weight (260.3 kg) was observed in May; however there were no significant difference between the three measurements.

It is evident that in land types B and C and overall, oxen weight has declined at the end of May and revived towards the end of September. This condition can be attributed partly to the work load (traction) of oxen during this period (April – May) and partly to the availability of feeds. Oxen are used for traction in the study area for about 90-120 days from April to October and most of the traction takes place between April and July. Hence, the oxen could lose weight to pay for the high energy cost demanded by the work.

It was difficult to make any meaningful correlations between the feed availability and oxen weight and condition while the magnitude of the impact of traction on the body weight and condition and the household feed allowance is not certainly known. However, it is known that the available feed during April-May (dry season) is inadequate both in quality and quantity to cover the energy cost for traction. Moreover, the revival of the oxen weight towards September could be both due to the better availability of feed (lush pasture and maize stover) in the wet season and the decrease in the work load. In contrast to the other land types, the weight of the oxen in land type A could not revive towards September. The possible reason could be that much of the ploughing of the vertisol (black soil) of land type A is done from June to September to plant wheat, tef (*Eragrostis teff*) and rough pea.

Body Condition Score

The overall average body condition score (BCS) of oxen in the watershed was 5.6 (M+) at the end of March, 5.3 (M) at the end of May and 5.4 (M) at the end of September (table 3). End of March and end of May measurements were supposed to show dry season performance while end of September measurements were supposed to show wet season performance. In general, there was a decline and rise in average BCS with end of March was significantly higher (P<0.05) than end of September and end of May measurements being the lowest. Body condition score between end of March and end of September, as well as between May and September was not significant. There was a moderate positive correlation (r) between average body weight and body condition score in all the three measurements viz,

Table 3. Overall average body condition score (mean ± SE) of oxen during different seasons in the Ginchi watershed (n=81)

Season	Weight
End of March	5.6±0.09a
End of May	5.3±0.07bc
End of September	5.4±0.8c

n=number of oxen, means between months within a column with different superscript letters are significantly (P<0.05) different

Table 4. Average body condition score of oxen by land type

Land types	End of March	End of May	End of September
A	6.1 ± 0.18^{a}	5.4 ± 0.12^{b}	5.3 ± 0.16^{bc}
B	5.6 ± 0.24^{a}	5.5 ± 0.16^{a}	5.2 ± 0.18^{a}
C	5.3 ± 0.1^{a}	5.2 ± 0.09^{adb}	5.5 ± 0.09^{adc}

Means between months within a row with different superscript letters are significantly (P<0.01, P<0.05) different

0.54, 0.43 and 0.44 values for end of March, end of May and end of September measurements, respectively

Effect of Season on Body condition Score of Oxen within Locations

In land type A, end of September average BCS values were the lowest 5.3 (M) indicating that the oxen were losing weight throughout the wet season. Body conditions of oxen were highly significantly ($P < 0.01$) better in March compared to May and September. The May and September average BCSs was not significantly different. Average BCS was least for September and highest for March. However, all the differences were not significant. In land type C, oxen had highest average BCS (5.6) at the end of March. Lowest BCS (5.2) were observed in May. The BCS of oxen was significantly ($p < 0.05$) better in September compared to May.

It was evident that in land types B overall body condition has declined at the end of May and revived towards the end of September. This condition can be attributed partly to the work load (traction) of oxen during this period (April – May) and partly to the availability of feeds. Oxen plough land in the area for about 90-120 days from April to October and most of the ploughing takes place between April and July. Hence, the oxen could lose weight to pay for the high energy cost demanded by the work. (Table 4).

CONCLUSION

It was difficult to make any meaningful correlations between the feed availability and oxen body condition as well as body weight while the magnitude of the impact of traction on the body condition and the household feed allowance is not certainly known. However, it is revealed that the available feed during April-May (dry season) is inadequate both in quality and quantity to cover the energy cost for traction. Moreover, the revival of the oxen body condition towards September could be both due to the better availability of feed (lush pasture and maize stover) in the wet season and the decrease in the work load. In contrast to the other land types, the body condition of the oxen in land type A could not revive towards September. The possible reason could be that much of the traction of the vertisol (black soil) of land type A is done from June to September to plant wheat, tef (*Eragrostis teff*) and rough pea.

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