Parturient behaviour and placental characteristics of Bos indicus cows


Les signes d'une mise bas imminente, le comportement lors du part et les caractéristiques du placenta ont été étudiés sur des vaches Zébu éthiopiennes des Hautes Terres. L'inflammation de la vulve, le relâchement du ligament pelvien et le gonflement de la mamelle sont les manifestations qui l'accompagnent. Elles ont été observées respectivement 6,2 ± 4,0, 25 ± 1,9 et 1,6 ± 0,9 jours avant la mise bas. L'écoulement du mucus vénal a été constaté 9,2 ± 4,8 jours avant le vêlage pour 52,6 p. 100 de vaches. Le taux de dépistage des signes d'une délivrance prochaine a donc atteint 77,6 p. 100. L'intervalle moyen entre l'agitation et le commencement du travail jusqu'au vêlage a été de 3,72 ± 2,01 et de 2,41 ± 1,37 heures respectivement. Les durées entre l'agitation et l'apparition de l'allanchochiorion (phase I), entre l'apparition des membranes foetales et le vêlage (phase II) et entre le vêlage et l'expulsion du placenta (phase III) ont été respectivement de 2,58 ± 1,93, 1,32 ± 0,9 et 2,50 ± 1,14 heures. La durée moyenne entre l'apparition de l'allanchochiorion et la délivrance était plus longue pour les mâles avec 1,55 ± 1,05 contre 0,83 ± 0,42 pour les femelles (également en heures). Le poids moyen des veaux à la naissance était de 20,8 ± 2,6 kg. Ce poids a augmenté avec la durée de la gestation (r = 0,52, P < 0,5) ainsi qu'avec le poids du placenta (r = 0,15). Pour conclure, et sous réserve de connaître la date de la saillie, la date de la délivrance ou peut être prédite et l'assistance obstétricale donnée en temps opportun pour éviter les dystocies sur les vaches Zébu éthiopiennes. Mots clés : Vache Zébu - Placenta - Parturition - Comportement - Éthiopie.

This study was undertaken using 19 multiparous Fhnpian Highland zebu cows from a herd of 42 animals maintained at the ILCA Debre Berhan experimental station. The station is located at an altitude of about 2850 metres, 120 km north of Addis Ababa. It has an annual rainfall of 977.4 mm (1979-1986) of which 70 % falls during the heavy rain season from June to September and the rest in small showers from March to April (21). The cows were bred naturally to a 3/4 Friesian (Bos taurus) x 1/4 Boran (Bos indicus) bull. Animals grazed during the day, but were penned and fed 2 kg grass hay each in an overnight enclosure. Minimal artificial lighting was available to monitor nocturnal behaviour. Cow body condition scores were 5 to 6 at calving (20).

Cows were under constant observation for one month before calving which was predicted using a gestation length of 283 ± 3 days (19). The date and time of occurrence or duration of the following signs were recorded:

- (i) imminent or impending parturition : udder fill-
Parturition included restlessness, labour onset, abdominal pain, presence of allantochorion (water bag), rupture of amnion, appearance of calf feet, calf on the ground and, placental expulsion.

In addition calf birth weight, cow post-partum weight, cow body condition score, calf sex, placenta weight and number of cotyledons were recorded. The following stages of parturition were identified: stage I - enlargement occurred over a much shorter period (1 to 4 days before calving) than vulva swelling, relaxation of the pelvic ligaments and vulva mucus discharge which were spread over a 1 to 19-day period. Vulva swelling was observed in 18 cows 6.2 ± 4.0 (mean ± SEM) days before calving. This was followed by a relaxation of the pelvic ligaments and udder enlargement 2.4 ± 1.9 (n = 17) and 1.6 ± 0.9 (n = 14) days before calving, respectively. However, mucus discharge was exhibited by only half the cows (n = 9; 47.3 %), 9.2 ± 4.8 days prior to calving. No udder oedema or colostrum leakage was recorded. Together 59 observations of imminent parturition symptoms were recorded from the 19 calvings, i.e. about 3.1 symptoms per delivery. This gave a detection rate of 77.6 %.

During parturition, cows became restless 3.72 ± 2.01 hours before calving. Cows walked aimlessly between frequent rest periods during which they often laid down and got up. Cows appeared absent-minded, but otherwise alert. Many licked or kicked their flanks while some isolated themselves or appeared to be left behind by the rest of the herd. The mean interval from restlessness to the appearance of the allantochorion (stage I) was 2.58 ± 1.93 hours.

Restlessness was followed by calmness and restricted movement. When left undisturbed, cows appeared to identify a circumscribed area for calf delivery. Labour onset occurred 2.42 ± 1.38 hours before calving. Cows laid down and repeatedly shifted their position. This was followed by a period characterized by abdominal pains and straining about 1.93 ± 1.33 hours before calving. There was no significant difference in the interval from labour onset to calving for male or female calves (2.6 vs 3.0 hours, respectively).

The interval from the appearance of the foetal membranes to delivery (stage II) averaged 1.32 ± 0.9 hours. The foetal membranes (water bag) ruptured 0.05 ± 0.61 hours before delivery. Many cows stood up and sniffed the first discharge of foetal fluids which were recorded for 0.64 ± 0.47 hours followed by the appearance of calf feet 0.50 ± 0.47 hours before calving. The interval from the appearance of the calf's feet until it was finally delivered, a measure of calving difficulty (18), ranged from 45 to 291 min (0.75 to 4.85 h). All calves were delivered in an anterior presentation, dorsal position and extended posture. Seventeen (89.5 %) calves were delivered while the cow was lying down. Two dropped to the ground when the dam stood up at mid-delivery.

The interval from calf delivery to spontaneous expulsion of the placenta (stage III) averaged 2.50 ± 1.14 (range 0.75 to 4.85) hours. However, in three cases involving female calves, membranes were expelled almost simultaneously with the calf. Although placenta retention time was longer after delivery of a male than after that of a female calf (2.31 ± 0.6 vs 2.84 ± 1.31 hours, respectively), this difference was not signifi-

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**TABLE 1** Average data for the external signs of parturition in zebu cows, as deviations in days (d) or hours (h) before or after calf delivery.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Deviation before or after delivery</th>
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<tr>
<td>Udder enlargement (d)</td>
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<tr>
<td>Vulva swelling (d)</td>
<td>18</td>
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<tr>
<td>Pelvic ligament relaxation (d)</td>
<td>17</td>
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<tr>
<td>Vagina mucus discharge (d)</td>
<td>10</td>
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<tr>
<td>Restlessness (h)</td>
<td>16</td>
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<td>Labour onset (h)</td>
<td>16</td>
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<td>Abdominal pains (h)</td>
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<tr>
<td>Sight of allantochorion (h)</td>
<td>15</td>
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<tr>
<td>Rapture of allantochorion (h)</td>
<td>16</td>
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<tr>
<td>Appearance of calf feet (h)</td>
<td>16</td>
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<tr>
<td>Placenta expulsion (h)*</td>
<td>13</td>
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</table>

* Three placentas were expelled almost immediately after calving.
The mean weight of the foetal membranes (placenta) was 2.7 ± 0.5 (range 2.0 to 4.5) kg. The average number of cotyledons (placentomes) per placenta was 70.7 ± 18.6 (range 41 to 112). Heavier cows tended to drop heavier foetal membranes (r = 0.46, P < 0.5). Consequently, heavier calves were frequently associated with heavier membranes (r = 0.15) and more placentomes (r = 0.36). Larger calves were delivered later after labour onset (r = 0.10).

**DISCUSSION**

Signs of imminent parturition recorded in this study were fairly similar to those observed in *Bos taurus* cattle (29). The large variation between cows (CV = 53 to 79%) was partly attributed to difficulties in precisely defining the start of these gradual processes. Moreover, Ethiopian zebu cattle have not been selected for dairy purposes. As a result, signs related to udder oedema and colostrum leakage were not observed. Furthermore, even in *Bos taurus* cattle, udder oedema was mainly observed before first calving, (BERGLUND et al. 6). These authors noted that udder enlargement started 1 to 2 weeks prior to calving, earlier than the 1 to 4 days recorded in the present study. In contrast, the present timing of vulva enlargement and relaxation of the pelvic ligaments was in closer agreement with these authors. The value of 3.1 signs of imminent parturition per calving reflected our ability to detect these signs and the dam’s ability to express them. There are no other data on this in zebu cattle. In the event, this value gave a detection rate of 77.6% and was regarded as favourable.

The present observation according to which as many calves were delivered during the day as during the night agrees with several previous authors (12, 14, 23, 32). This finding, however, disagrees with ARTHUR (2) who reported that two-thirds of calvings in housed cattle took place from 18.00 to 06.00 hours and EWANK (13) who estimated that 64% of the calvings occurred during the day. Consequently, there does not appear to be conclusive evidence that cows give birth more frequently to calves at a given time of the day than at other times (1, 23).

The wide range observed in the time from restlessness to calf delivery (0.91 to 8.28 h) indicates that the parturition process in zebu cattle can either be very short or long. The present estimates of 2.58 ± 1.93 and 1.32 ± 0.90 hours for stage I and II duration, respectively, are in keeping with 144 ± 19 and 66 ± 8 min (2.4 and 1.1 hours) obtained by BERGLUND et al. (6). However, our estimate of 2.50 ± 1.14 hours for stage III was shorter than that observed by these and other authors (6, 10, 11). We observed that while the interval from labour onset to parturition (stage II) was the same following the delivery of male and female calves (2.6 vs 3.0 hours), as previously reported for *Bos taurus* cattle (6, 14, 22), the interval from the appearance of calf feet to delivery was actually longer for male than for female calves (0.59 vs 0.36 hours, respectively). This agrees with the 40.2 ± 5.1 and 20.8 ± 6.2 min reported by OWENS et al. (23). DOORN-BOS et al. (7). made a similar observation even though the difference recorded was only 8 min. These observations seem to suggest that while calves may actively participate in assuming the normal position presentation and posture, their dams assume more responsibility for final calf expulsion. Male calves take longer to be delivered and are associated with more calving difficulties. We also estimated that the interval from the appearance of the calf feet to delivery (a measure of calving difficulty) was longer for male than for female calves (1.56 ± 1.05 vs 0.04 ± 0.43 hours, respectively). This may be attributed to their higher birth weights which may also be influenced by the gestation period. But other observations must confirm these results. Male calves are carried for 4-5 days more (20.29) which may result in a higher birth weight. In Ethiopia, it has been estimated that for each kg increase in birth weight cows carried their calf 0.7 day longer (3).

The present estimate of 0.75 to 4.85 h for the expulsion of the placenta is within the range of previous values of 2 to 6 hours (1) for *Bos taurus* and 5.16 hours reported for Ongole zebu cows (28). We additionally observed, as did GEORGE and BARGER (14) using Hereford cows, that the foetal membranes were expelled later following the delivery of a male calf (2.84 vs 2.31 hours, respectively).

There are limited data on the placental characteristics of zebu cows. Our results show that the placenta was about 1% of the calf birth weight and 13% of the post-partum dam weight. Respective values obtained in Ongole cows (31) were 0.66% and 10%. The disparity probably arose from breeding the small Ethiopian Highland zebu to a large sized sire.

The present estimate of 70.7 cotyledons per placenta agrees with the 69 reported by STICKLAND and PURTON (30) for zebu cattle. It is important to note that heavier calves tended to be delivered by heavier dams and with heavier membranes and more cotyle-
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dons. As a consequence, since heavier membranes tended to come from the heavier dams, the importance of adequate pre-partum dam nutrition is emphasized.

CONCLUSION

Few studies are reported on the periparturient behaviour of Bos indicus (zebu) cows. The present data, however, show that they exhibit basically the same signs and stages previously associated with delivery in Bos taurus cows. Vulva swelling, pelvic ligament relaxation, udder enlargement and, sometimes, vaginal mucus discharge, are reliable symptoms for predicting impending delivery in zebu cows. Larger cows are likely to deliver calves with heavier fetal membranes having a larger number of cotyledons.

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REFERENCES


