

Is social status passed on from Cow to Calf?



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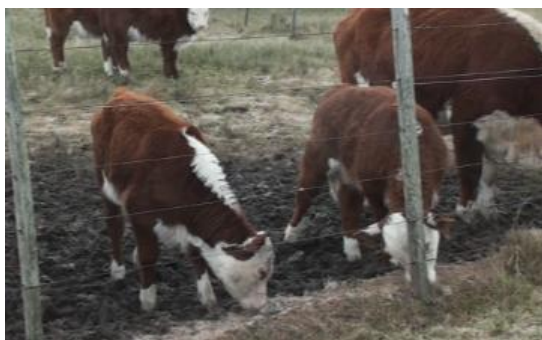
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Abstract

Within a herd of cows a complex social structure exists. Ranking orders between cows are not simply linear and difficult to see. Knowledge on social structure between calves is limited. Only a few studies were performed on calf behavior and none were done specifically on calf dominance, which is not exhibited by calves until five months of age, according to some reports. It would be interesting to determine whether calves that have dominant mothers are themselves prone to be dominant calves. If so, one could select replacement cows on basis of their social status because social ranking is related to lameness prevalence and milk yield in the adult life. Negative effects of low ranking positions can be lack of socio-positive relationships and hygiene. In order to determine if social status is passed on from cow to calf, 23 cows and their calves were followed during a period of 6 weeks. Ranking orders for both cows and calves were determined and analyzed, but no significant correlation was found. Social status is apparently not passed on from cow to calf. Calves of high ranking mother do not have a greater chance of being high ranking themselves. Furthermore a significant difference was found in the types of dominance behaviour expressed by cows and calves. Cows perform more flank pushes whereas calves perform more head butts.



Introduction

Within a herd of cows a complex social structure exists. When multiple cows live in close proximity of each other, there will be some sort of social hierarchy and the individual behaviour will depend on the ranking order of each of the individuals. (Schein, Fohrman 1955) The basis of social organization in most ungulates is a matriarchal group, in which aggressive behaviour is rare and dominance relationships difficult to reveal. (Gygax, Neisen et al. 2010) This suggests that preferential relationships exist between members of these groups and are responsible for their cohesion. In cattle, affinities include spatial proximity, reduced aggressiveness, enhanced positive interactions and tolerance in competitive situations' (Bouissou 1974, Plusquellec, Bouissou et al. 2001)

Dominance associated behaviour that can be observed between two individuals in a herd include; the approach, the threat and the physical contact followed by either victory or defeat. (Schein, Fohrman 1955) In order to determine the ranking order of a herd of cows, one must try to observe as many of these encounters as possible. At least one encounter between every single one of the herd members, but preferably more to confirm the results. (Wagnon, Loy et al. 1966) There is a maximum number of relationships formed among two individuals, dyads, in a group. This number can be calculated by the following formula; $dyadmax = 1/2 n(n - 1)$, with n being the number of individuals in a group. (J. Langbein 2004) Most researchers use a binomial approach to determine ranking orders. This means that in each interaction one cow is scored as the winner, and one as the loser. But there are also many researchers that calculate ranks based on the ratio of wins and losses, which is a much more simplistic approach. (J. Langbein 2004)

It has been suggested that age (Schein, Fohrman 1955), weight, size and breed are factors that contribute to the rank of a cow. (Wagnon, Loy et al. 1966) But there seems to be no information on direct heritability of dominance. However, the Dutch company CRV uses 'behavior at the milk pit' as a criterion to determine the breeding values of their bulls. For example, the famous Dutch bull Sunny Boy has a negative breeding value for the behaviour of his daughters. This would mean that the company believes that there is heritability of dominance, at least from the sire. (J. van Cappellen Editor at Veeteelt Magazine)

Knowledge on ranking orders between calves is limited. Only a few studies were performed on calf behavior and none were done specifically on calf dominance. Reinhardt and Reinhardt even state that calves don't exhibited dominant behavior until five months of age. (Reinhardt V , Reinhardt, Mutiso et al. 1978) Meyer-Holzappel has formulated the 'characteristics of play' in 1956 (Meyer-Holzappel 1956); She proposed the following criteria for play behavior, the absence of these criteria would mean that the observed interaction is not play, but dominance behavior. First of all there the behavior lacks a serious motivation, i.e. mounting has no breeding possibility or purpose and pushes to the body are not preceded by threats, nor are they followed by butting of the head. Furthermore, the behavior is not continuous. It can stop as abruptly as it started. And last of all, the roles of calves that exhibit the behavior are exchangeable, there is not a clear winner to be pointed out.

The observer should, therefore, be very cautious as to what behavior will be called dominance behavior and what is in fact play behavior.

Some researchers state that once a herd of cows is well established, the relevance of agonistic interactions, such as threats, flank and head butting, for the description of the cows' social relationships is questionable, given that these interactions are rare and of low intensity (Gygax et al. 2006) and occur among the same cows that exchange positive behavior (Gygax, Neisen et al. 2010) However, agonistic interactions have been used with success by other researchers to determine ranking orders and social relationships in herds of cows, as shown by Wagnon (Wagnon, Loy et al. 1966) and according to Jan Langbein, agonistic behaviors are the clearest and most unambiguous interactions to be observed. Furthermore, he points out that a recorded agonistic behavior should be

followed by submissive behavior of the other cow, in order to be able to assess the outcome. (J. Langbein 2004)

Reinhardt et. al (Reinhardt V , Reinhardt, Mutiso et al. 1978) did a study on calf-calf behavior and classified the types of social behavior seen. It was mostly play behavior but they did see eight threats in an observation period of 164 days. This would suggest that calves rarely exhibit dominance behavior. However, Vitale et al. (Vitale, Tenucci et al. 1986) also found 'frontal pushing' behavior but they have interpreted it as play behavior rather than dominance behavior. This interpretation could be wrong and might feed the idea that there is no social ranking. Because communication in ruminants is mostly very subtle, many signs of dominance could have been missed in previous studies due to misinterpretation of presumed "play behavior".

Dominant aggressive behavior in the English Cocker Spaniel has a proven genetic basis and heritability of 0.46 on the maternal side. (Pérez-Guisado, Lopez-Rodríguez et al. 2006) It would be interesting to determine whether calves that have dominant mothers are themselves prone to be dominant calves as well. If so, one could select replacement cows on basis of their social status because social ranking is related to lameness prevalence (Galindo, Broom 2000) and milk yield (Sołtysiak, Nogalski 2010) in the adult life. According to David Val-Laillet (Val-Laillet, Passillé et al. 2008) cows that are lower ranking, also experience negative effects of this low ranking position such as lack of socio-positive relationships and hygiene. It would, therefore, be helpful to be able to predict the social status of a calf by the social status of its mother. This way socially balanced groups could be formed at an early age. Of course there will always be bosses and scapegoats but once a herd is well established, there is less agonistic behavior (Gygax, Neisen et al. 2010). By introducing a replacement cow into a herd that has another dominance level than the replaced cow, instability will be created. It could be possible to minimize the instability by introducing a cow that can presumably 'fill up' the place in the ranking order left by the replaced cow.

Materials and methods

A herd of twenty three cows and their calves of the Hereford breed was selected from a larger herd of about sixty cows. The herd is owned by the veterinary faculty of Montevideo, Uruguay for the double purpose of producing beef cattle on one hand and creating a teaching opportunity for students on the other. Originally, the twenty three cows and their calves walked among the larger herd of sixty cows. After 2,5 weeks the 'mother' cows and their calves were separated from the larger herd to make it easier to determine the social relations between these cows and calves. After the separation the new-formed herd was kept intact. At the start of the observation period, the calves were one to three weeks old, with variation in age between them. At the end of the observation period the calves were 7 to eleven weeks old. The cows and calves in this study were kept in semi-natural conditions. They had approximately 10 ha of grassland and a creek ran through the pasture, providing a natural watering place. Once a day, usually in the morning at 9.00 am, they were fed a grain mixture alongside the part of the fence, closest to the farm buildings. The workers divided the mixture over approximately 25 meters on the ground, so every cow had an estimated one stretched meter to feed. Additionally twice a week a large bale of hay, of about 1.5 m³, was provided. Each cow was branded with the brand mark of the veterinary faculty and had a tag in the ear with their personal identification number. The calves did not yet have any form of identification so they were described by appearances and will be referred to by their mother's number in this report. Recordings were made every morning (9:00 – 10:30) at the feeding place. In the late morning (10:30 – 12:30) the cows were followed through the pasture on horseback or by foot. In the afternoon (13:30 – 17:00) the recording proceeded by following the movement of the herd, until the dusk set in. Three types of dominance display were recorded, namely butting to the head or body, specifically the flank, and threats. These forms of dominant behavior have been described by many researchers including Schwein and Wagnon. Amongst calves, mounting was also recorded. After determining which calve belonged to which cow, an attempt was made to determine a ranking order for the cows and also one for the calves.

Data analysis

The recorded data was analyzed in a simple ethogram. The observed behavioral elements included confrontations in the form of head butting, flank butting and threats. In addition, the outcome of these confrontations was recorded i.e. whether or not the confronted cow responded by withdrawing. If the confronted cow withdrew it was registered as a victory and if the initiating cow had to withdraw it was registered as a defeat. All the above mentioned was done likewise for the calves.

A ranking order was determined by calculating the percentage of confrontations that resulted in victories or if there were no victories at all, the amount of defeats. The cow with the highest percentage of victories is placed at the top of the social order, the cow with the lowest percentage (0%) of victory and the highest count of defeats is placed at the bottom of the social order. And again the same was done for the calves. As mentioned in the introduction, this method of establishing ranking order is not the most reliable method available (J. Langbein 2004) but there were not enough recorded interactions per individual to use another approach.

Since there was a change in herd size during the period of observations, it would be interesting to see if this affected the ranking order of the cows. So a second ranking order was determined using only data collected after the change in herd and pasture.

After the ranking orders were established and analyzed, the ethogram was again consulted to see how many cows have had a confrontation with a cow that outranked them, and won. This was also done for the calves.

Statistical analysis

All recorded data was organized and put into Microsoft Excell. The Excell data were imported into IBM SPSS statistics Version 20. An analysis using ranks, the cows and calves were ranked 1 to 23, was used to study the correlation between rank of the mother and rank of the calve. Firstly a scatterplot was made to roughly estimate if such a correlation exists. To conclusively determine if a correlation exists and if it is a significant correlation a Spearman two-tailed test was performed.

Additionally, all reported behavioral acts were analyzed to see which behavioral acts of dominance were recorded most and if there is a significant difference in cow and calf dominance behavior. A simple bar graph was used to show which behavioral acts of dominance were recorded. And a Mann – Whitney U test was used to analyze the statistical significance of this difference.

Results

During the observation period of 6 weeks in June and July of 2012, 145 observations of dominance display were recorded amongst the cows, 77 observations of dominance display were recorded amongst calves. A ranking order was determined for the cows as well as for the calves (Table 1). Using the method explained earlier.

| Cow | Ranking order | Calf | Ranking order |
|------|---------------|------|---------------|
| 1237 | 1 | 1224 | 1 |
| 1224 | 2 | 9694 | 2 |
| 1214 | 3 | 1245 | 3 |
| 1222 | 4 | 9696 | 4 |
| 9701 | 5 | 9717 | 5 |
| 1225 | 6,5 | 9734 | 6 |
| 1245 | 6,5 | 1214 | 7 |
| 1260 | 8 | 1222 | 8 |
| 1215 | 9 | 1213 | 10,5 |
| 1209 | 10 | 1260 | 10,5 |
| 9696 | 11 | 2039 | 10,5 |
| 9734 | 12 | 9700 | 10,5 |
| 9692 | 13 | 1237 | 13 |
| 1207 | 15 | 1203 | 14 |
| 1213 | 15 | 1225 | 15 |
| 9700 | 15 | 1209 | 16,5 |
| 2039 | 18 | 9692 | 16,5 |
| 9694 | 18 | 1215 | 18,5 |
| 9703 | 18 | 9703 | 18,5 |
| 9717 | 20 | 2043 | 20 |
| 2043 | 21 | 9701 | 21 |
| 1203 | 22 | 1207 | 22 |
| 9732 | 23 | 9732 | 23 |

Table 1: Ranking order of cows and calves

When roughly assessing the comparison of ranking orders, there is only one pair of cow and calf that share the same ranking namely, cow and calf 9732, which are both the lowest in ranking. After establishing a ranking order for both cows and calves a scatterplot was made to determine if a correlation seemed likely (Figure 1). The scatterplot showed a seemingly random distribution of dots with no apparent correlation.

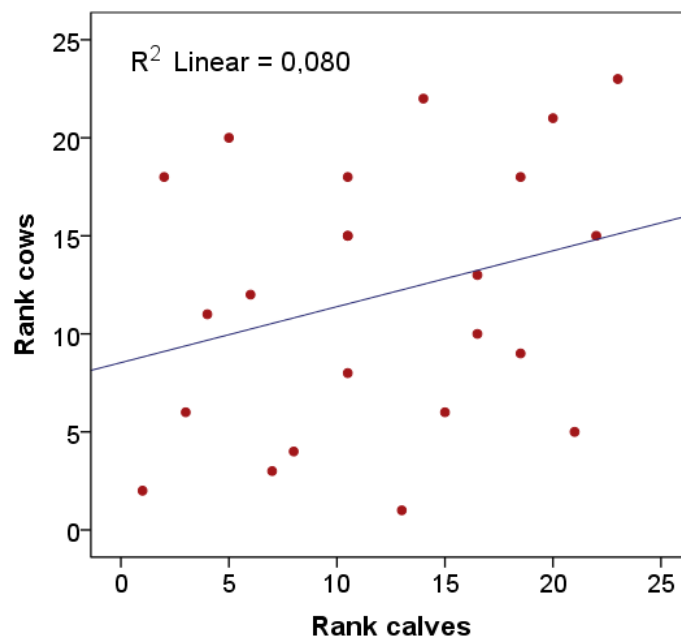


Figure 1: Scatterplot showing ranks of cows and ranks of calves

| Correlation coefficient; Ranking order cows – Ranking order calves | | |
|---|-------------------------|-------|
| Spearman's Rho N = 23 | Correlation coefficient | 0,282 |
| | P-value | 0,192 |

Table 2: Spearman's Rho test of ranking order of cows and calves

A Spearman's test was used to calculate the exact amount of correlation (Table 2). The rank correlation coefficient of 0.282 was assessed using a $P < 0,05$, at which there is no significant correlation to be found. This would mean that social status is not passed on from cow to calf.

During the observation period, the cows and their calves were moved. They were separated from the larger herd and led to another pasture. After this move and separation it was easier for the observer to identify the cows and calves but also to record all dominance displays. Furthermore, when the cows were placed in another pasture and a smaller herd, the displays of dominance multiplied (53 observations in the first 2,5 weeks, compared to 92 observations in the last 3,5 weeks, which is an incline of 24%) as was suspected as a cause of reestablishing ranking order. Because of this noticeable change, a ranking order was also calculated using only the data recorded after the move (Table 3).

| Cow | Ranking order | Ranking order after separation |
|------------|----------------------|---------------------------------------|
| 1237 | 1 | 1 |
| 1224 | 2 | 4 |
| 1214 | 3 | 2 |
| 1222 | 4 | 5 |
| 9701 | 5 | 3 |
| 1225 | 6,5 | 7 |
| 1245 | 6,5 | 7 |
| 1260 | 8 | 7 |
| 1215 | 9 | 11 |
| 1209 | 10 | 9 |
| 9696 | 11 | 10 |
| 9734 | 12 | 14 |
| 9692 | 13 | 12 |
| 1207 | 15 | 14 |
| 1213 | 15 | 14 |
| 9700 | 15 | 18.5 |
| 2039 | 18 | 18.5 |
| 9694 | 18 | 16.5 |
| 9703 | 18 | 16.5 |
| 9717 | 20 | 20.5 |
| 2043 | 21 | 20.5 |
| 1203 | 22 | 23 |
| 9732 | 23 | 22 |

Table 3: Comparison of ranking orders of cows before and after pasture change

| Evaluation of cow ranking orders | | |
|----------------------------------|---------|--------------|
| | N | Mean Ranking |
| Rank II < Rank I | 12 | 11,63 |
| Rank II > Rank I | 10 | 11,35 |
| Rank II = Rank I | 1 | |
| Wilcoxon Ranks Test | P-value | 0,669 |

Table 4: Wilcoxon signed ranks test for the comparison of cows ranking order before and after pasture change

A Wilcoxon signed ranks test was performed to determine if the changes in ranking order were significant (Table 4). The P value was $> 0,05$ (0,669), not significant. Apparently the change in herd size and pasture did not cause a significantly altered ranking order.

During the observation period a difference was noticed in the types of dominance behavior displayed by calves and cows. To determine if such a difference indeed exists and to assess the significance of this presumed difference, bar charts were made (Figures 2, 3, 4 and 5) and a Mann – Whitney U test was performed.

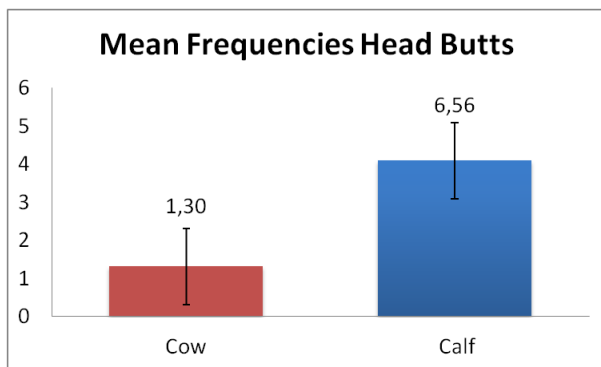


Figure 3: Mean frequencies of head butts; comparison of cows and calves

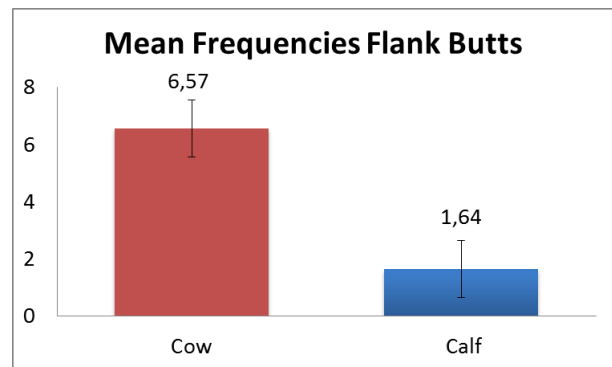


Figure 2: Mean frequencies of flank butts; comparison of cows and calves

When roughly assessing the charts above, a clear difference can be noted between cows and calves. Whereas cows seem to perform more flank butts, calves perform more head butts. There were no observations made on displays of threats in calves. This is also seen in the chart below.

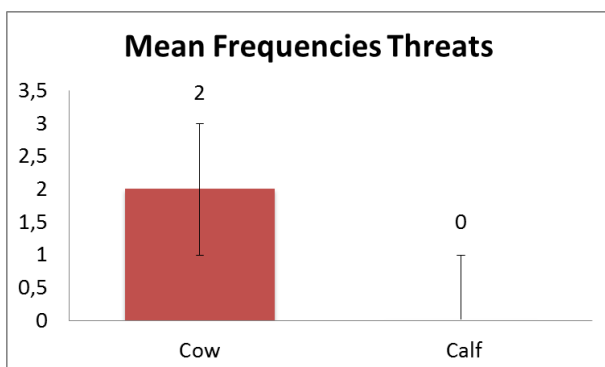


Figure 5: Mean frequencies of threats; comparison of cows and calves

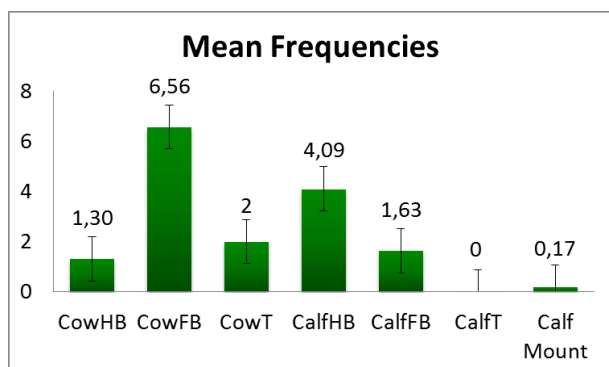


Figure 4: Mean frequencies of all the types of behavior observed

A Mann – Whitney U test was performed to analyze the difference between calf and cow in terms of head butts and flank butts (Tables 5 and 6).

| Head butt evaluation | |
|--------------------------------|-----------------------|
| | Mean frequency |
| Cows | 1,304 |
| Calves | 4,217 |
| Mann-Whitney U; P-value | 0,000 |

Table 5: Mann-Whitney U test; the difference in mean head butt frequencies of cows and calves

The P value < 0,05, so there is a significant difference in frequency of recorded head butts between calves and cows.

| Flank butt evaluation | |
|--------------------------------|-----------------------|
| | Mean frequency |
| Cows | 6,565 |
| Calves | 1,783 |
| Mann-Whitney U; P-value | 0,000 |

Table 6: Mann- Whitney U test for the difference in mean flank butt frequencies of cows and calves

The same P value is found for frequency of flank butts. P value also < 0,05, which indicates that there is also a significant difference observed in frequency of recorded flank butts between calves and cows.

Amongst all the observations made after the separation and pasture change (N=92) it only occurred seven times that a lower ranking cow won a confrontation with a higher ranking cow (7,6 %). All of the other outcomes of confrontations were according to ranking order. Calves tended to win a confrontation with a higher ranking calf more often, eleven times out of 77 observations (14,3%).

Discussion

Social status is apparently not passed on from cow to calf. Calves of high ranking mother did not have a greater chance of being high ranking themselves. It would be interesting to re-evaluate the ranking orders of the calves when they are adults. In this follow up investigation the female calves would be observed when they have had their first calf and their rank would be analysed with the existing data of their mothers.

This would be particularly interesting because of the general opinion that all calf interactions are play behaviours instead of dominance. When using the criteria for play behavior by Meyer-Holzapfel, it is possible to distinguish between dominance and play behavior. There often was a serious motivation to be noted, either competition by the bale of hay or the udder of a cow. Also the calves for the most part did not abruptly stop pushing or butting, there was usually a clear winner to be pointed out. This behaviour is not concurrent with the criteria mentioned above and so it would suggest that there is dominance behaviour in calves. (Meyer-Holzapfel 1956)

However more information is needed to assess the reliability of the ranking orders amongst calves. The calves were of different ages, as much as 2 or 3 weeks apart, and consequently of different weights. They were of different sexes and maybe also different fathers. Weight, age and sexe are factors known to contribute to social status in cows (Wagnon, Loy et al. 1966, Schein, Fohrman 1955) and maybe also contribute to the dominance of calves. This could have had a large influence on the ranking order.

When taking these uncertainties, plus the small sample size, into consideration, a $p < 0,05$ might be too harsh a limit to assess the correlation coefficient. When a $p < 0,10$ is found, it is considered a trend. The p-value in the present study was found to be 0,192, this is neither significant, nor a trend, but it may suggest that a trend could be found when the uncertainties are excluded and the sample size augmented.

Also the method used to determine the ranking orders in cows, as well as in calves is not the preferred method by sociometric analysts. According to Langbein this approach makes it impossible to judge the dominance rank of an individual with regard to the other sociometric levels (e.g. the strength or stability of dyadic relationships or dominance hierarchy) and may lead to misinterpretation of the results. (J. Langbein 2004) It would have been better to use a binomial approach, however not enough data has been collected on all of the individuals to perform this kind of approach.

After the first 2.5 weeks, the mothers and calves were separated from a larger herd. It was expected that the cows in the new formed herd would re-establish a ranking order and that the separation would have an effect on ranking order between cows. However, after analysing data previous to the change and after the change no significant changes in ranking order were found. For the interaction amongst the calves, the change was very positive. Because of the smaller herd size, the calves remained much closer together and interacted more.

Furthermore, a significant difference was found in the types of dominance behaviour expressed by cows and calves. Cows perform more flank butts whereas calves perform more head butts.

The outcome of this study was not as expected beforehand. It would be an advantage to be able to predict the social status of a replacement cow, but based on the present study, social status does not seem to be passed on from cow to calf. It became clear however, that there is a gap in knowledge as to dominance behaviour in calves. During the research period, a considerable amount of dominant

interactions amongst calves have been observed, bearing in mind the criteria proposed by Meyer-Holzapfel. More research needs to be done on social systems, behaviour and ranking order in calves.

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Appendices

Data observation cow versus cow (* headbutt, / flank butt O threat)

| | | | | | | | |
|------|------|---|-----|------|------|---|---|
| 1215 | 1257 | D | / | 1237 | 9703 | V | / |
| 9701 | 5577 | V | * | 1222 | 1209 | V | / |
| 9700 | 2050 | V | / | 1222 | 1207 | V | * |
| 1215 | 1216 | D | / | 1237 | 9732 | V | / |
| 9734 | - | V | / | 1214 | 9700 | V | / |
| 9734 | 1256 | D | / | 1222 | 1203 | V | / |
| 1237 | 1200 | D | / | 1224 | 1207 | V | / |
| 9696 | 1216 | D | O | 1214 | 1209 | V | O |
| 9732 | - | D | / | 1237 | 1222 | V | / |
| 9700 | 9701 | D | / | 1214 | 9717 | V | / |
| 1215 | - | D | / | 1237 | 9717 | V | / |
| 9696 | - | D | O | 1237 | 1225 | V | / |
| 1222 | 1239 | V | / | 1237 | 9732 | V | / |
| 1260 | 9734 | V | O / | 1237 | 9692 | V | / |
| 1224 | 1222 | V | / | 1207 | 1225 | V | * |
| 1222 | 9732 | V | / | 9696 | 9694 | V | / |
| 1222 | 1203 | V | / | 1214 | 1213 | V | * |
| 1214 | 1225 | V | O | 1209 | 9696 | V | / |
| 1214 | 1203 | V | / | 1214 | 1260 | V | / |
| 1214 | 9732 | V | O | 1214 | 9692 | V | / |
| 9701 | 2039 | V | * | 1214 | 9717 | V | O |
| 1209 | 1215 | V | / | 1224 | 1203 | V | O |
| 1237 | 1213 | V | / | 1214 | 1260 | V | O |
| 1215 | 9696 | V | / | 1224 | 9696 | V | O |
| 9717 | 1222 | D | O | 1224 | 9734 | V | O |
| 1237 | 1213 | V | / | 9701 | 9696 | V | / |
| 1213 | 9696 | V | / | 1225 | 1203 | V | / |
| 1237 | 1214 | V | / | 1225 | 2043 | V | O |
| 1237 | 1207 | V | / | 1225 | 9692 | V | O |
| 1224 | 1222 | D | / | 1214 | 9694 | V | / |
| 9701 | - | V | / | 1209 | 9696 | V | * |
| 9701 | 9700 | V | * | 1245 | 2043 | V | / |
| 9701 | 1213 | V | / | 1214 | 9734 | V | / |
| 9701 | 9696 | V | O | 1214 | 1207 | V | / |
| 1222 | 9732 | V | * | 9696 | 1209 | V | / |
| 1222 | 9703 | V | / | 1260 | 9734 | V | / |
| 1222 | 1237 | D | * | 1214 | 1237 | V | / |
| 9696 | 2043 | V | / | 1214 | 9703 | V | / |
| 1260 | 9732 | V | / | 1214 | 1260 | V | / |
| 1237 | 9696 | V | O | 1214 | 9734 | V | / |
| 1237 | 9701 | V | O | 1214 | 9696 | V | / |
| 1237 | 9701 | V | / | 1260 | - | V | / |
| 1222 | 1209 | V | / | 1214 | 1222 | V | / |

| | | | | | | | |
|------|------|---|---|------|------|---|---|
| 1222 | 9717 | V | O | 1222 | 9694 | V | / |
| 1222 | 2043 | V | / | 9692 | 2039 | V | / |
| 1237 | 1215 | V | O | 9734 | 9700 | V | * |
| 1237 | 1260 | V | O | 1245 | 9701 | D | O |
| 1224 | 1207 | V | O | 1224 | 1203 | V | * |
| 1222 | 1213 | V | / | 1237 | 2039 | V | O |
| 9696 | 2043 | V | / | 1237 | 9700 | V | / |
| 9696 | 1203 | V | / | 9696 | 2039 | V | / |
| 1237 | 1222 | V | / | | | | |

Data observations calf versus calf

| | | | | | | | |
|------|------|---|-------|------|------|---|---|
| 9703 | 1213 | V | / * | 1225 | 1203 | D | / |
| 1203 | - | D | * | 9734 | 9696 | D | / |
| 9696 | cow | O | * | 1237 | 1222 | V | * |
| 1215 | 9701 | V | * | 1224 | 9700 | V | * |
| 1237 | - | O | * | 9696 | 9700 | V | * |
| 1237 | - | | mount | 1245 | 9692 | V | * |
| 9694 | - | V | / | 1222 | - | D | * |
| 1214 | - | V | * | 9696 | 1203 | V | * |
| 9696 | - | O | / | 1225 | 1237 | V | * |
| 1237 | - | V | / | 2039 | - | V | * |
| 1245 | 9696 | D | * | 1224 | 1215 | V | * |
| 9696 | 1245 | D | / | 1245 | 1207 | V | * |
| 1245 | cow | | mount | 1214 | 1207 | V | * |
| 1260 | 9692 | V | * | 1245 | 1214 | V | * |
| 1203 | 1237 | V | * | 1224 | 9703 | V | * |
| 1203 | 1225 | O | * | 1214 | 1224 | V | / |
| 1224 | cow | O | * | 1225 | 9717 | V | / |
| 2043 | 9732 | V | * | 1225 | 1222 | V | * |
| 1224 | - | V | * | 1245 | 1207 | V | * |
| 9694 | 1245 | V | * | 9717 | 1260 | V | / |
| 1225 | 9717 | D | * | 9734 | 2039 | V | / |
| 9700 | 9732 | V | * | 9734 | 9732 | V | / |
| 1260 | 9696 | D | * | 9692 | 1215 | V | / |
| 1222 | 1225 | V | * | 9717 | 9700 | V | / |
| 1224 | 9696 | O | mount | 1224 | 9734 | V | / |
| 9717 | 1224 | V | * | 1224 | 1203 | V | / |
| 9696 | 9703 | V | / | 2039 | 9703 | V | * |
| 9700 | - | V | * | 1225 | 1215 | V | / |
| 9694 | 9717 | V | * | 9734 | 2039 | V | * |
| 1222 | 9734 | V | * | 9696 | 9734 | V | * |
| 1209 | 9732 | V | * | 9734 | 9732 | V | / |
| 9734 | 1225 | V | * | 9717 | 1237 | V | * |
| 9734 | 1222 | V | * | 9696 | 1224 | V | / |
| 1222 | 1209 | V | * | 9696 | 9717 | V | * |

| | | |
|------|--------|---|
| 9717 | 9734 V | * |
| 1203 | 1225 V | * |
| 1224 | 1237 V | * |
| 1213 | 9703 V | * |
| 1260 | 1209 V | * |
| 1224 | 9701 V | * |
| 9734 | 1237 V | * |
| 9717 | 1214 V | / |
| 1224 | 1225 V | / |

Resume of number of confrontations, victories and defeats per cow/calf and their calculated ranking order.

| Cow confront | Victories | Defeats | Rank (calcula | Calf confront | Victories | Defeats | Rank (calcula |
|--------------|-----------|---------|---------------|---------------|-----------|---------|---------------|
| 8 | 0 | 8 | 22 | 7 | 3 | 3 | 14 |
| 6 | 1 | 5 | 15 | 3 | 0 | 3 | 22 |
| 14 | 5 | 9 | 10 | 3 | 1 | 2 | 16,5 |
| 6 | 1 | 5 | 15 | 2 | 1 | 1 | 10,5 |
| 23 | 19 | 3 | 3 | 5 | 3 | 2 | 7 |
| 18 | 7 | 11 | 9 | 5 | 1 | 4 | 18,5 |
| 20 | 15 | 5 | 4 | 7 | 4 | 3 | 8 |
| 8 | 7 | 1 | 2 | 13 | 10 | 2 | 1 |
| 6 | 3 | 3 | 6,5 | 10 | 4 | 5 | 15 |
| 29 | 26 | 3 | 1 | 9 | 4 | 4 | 13 |
| 2 | 1 | 1 | 6,5 | 7 | 5 | 2 | 3 |
| 10 | 4 | 6 | 8 | 4 | 2 | 2 | 10,5 |
| 4 | 0 | 4 | 18 | 4 | 2 | 2 | 10,5 |
| 6 | 0 | 6 | 21 | 0 | 0 | 0 | 20 |
| 4 | 1 | 3 | 13 | 3 | 1 | 2 | 16,5 |
| 4 | 0 | 4 | 18 | 4 | 3 | 0 | 2 |
| 19 | 6 | 13 | 11 | 12 | 8 | 0 | 4 |
| 6 | 1 | 5 | 15 | 6 | 3 | 3 | 10,5 |
| 15 | 11 | 4 | 5 | 2 | 0 | 2 | 21 |
| 4 | 0 | 4 | 18 | 5 | 1 | 4 | 18,5 |
| 5 | 0 | 5 | 20 | 11 | 7 | 4 | 5 |
| 9 | 0 | 9 | 23 | 4 | 0 | 4 | 23 |
| 10 | 3 | 7 | 12 | 13 | 8 | 5 | 6 |