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DEVELOPMENT OF BODY WEIGHT AND BODY  
CONDITION OF RENDILLE CAMEL TYPES IN  
NORTHERN KENYA

Diploma Thesis by

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## 6 CONCLUSION

The aim of the study to characterize the local breed Rendille camel in terms of body size and weight development as well as adult body dimensions could be achieved. The differentiation of four types within the breed Rendille camel according to drought tolerance and not according to differences in body dimensions independent of condition could be confirmed for the most part. To assess drought tolerance the condition at the end of the dry season was taken as a measure of drought tolerance in accordance with the local assessment of it. To measure condition the hump circumference measurement led to a differentiation of the types, while hump height and width were similar for all types. The local assessment could also be retraced better by the parameter 'Body Condition Scores' (BCS) which clearly separated the two extreme types from the two intermediate ones. Incorporating the stage of lactation into the assessment of body condition would further refine the information.

The established parameter height at the withers proved more reliable if supplemented with the parameter rump length which covered a longer time span of growth for assessing the body size development pattern of the camels and as a part of describing their adult body sizes. The assessment of the termination of body size development by measuring the circumference of the cannon bone proved not suitable due to the difficulty of measuring it in young and not very docile camels. There were only two significant differences in the body dimension between types. The height at the withers for Coitte where it proved significantly shorter than the three other types and breast width where Godan proved to have a significantly wider breast and Coitte a significantly smaller one.

Body condition scoring proved the most suitable method assessing body condition. Body condition is often of more biological importance than sheer weight and could be used further. Although the BCS had 8 levels it could be applied consistently because of clear hints for differentiation between the various levels. Additional comparison, for example with the body fat content after slaughter could help to sustain the method further on.

The study showed therefore that even within the short data gathering period of less than three months it is possible to gather a detailed and differentiated assessment of traits given (based on indigenous criteria). A crucial point thereby was to use traits of importance in the production environment which could be measured with methods suitable for field research. Since the classification into types made by the keepers could be confirmed their knowledge could be incorporated into breeding programs in the future. A systematic appraisal of the trait 'drought tolerance' in livestock is at its very beginning. The present study is one step in the direction of further research into it. If a comparison of the types on a more physiological level could be done (turn-over rate, maintenance requirement) it would be recommendable to explore the topic.

## 7 SUMMARY

Despite the prominence of camels in arid regions of Africa little research has been done to characterise the various camels breeds. The present study aims to characterise the local breed 'Rendille camel' in terms of adult body dimensions, growth of height and weight gain and adaptation to drought (condition at the end of the long dry season). Within the adult camels a type differentiation based on body dimensions and condition parameters was done. A special emphasis hereby lied on including parameters which are relevant in the indigenous context and using methods suitable for use in the field. The study was conducted among Rendille pastoralists of Marsabit district in the arid north of Kenya. Agriculture in the region relies widely on pasture-based animal husbandry. The main livestock species kept are camels, cattle, goats and sheep with camel being traditionally of paramount importance.

A total of 461 animals was assessed and additional information gathered from their herdsman during the study period from July to October 2003. Data covered biometric measurements, condition parameters, general information about the animal and it's pedigree as well as Body Condition Scores (BCS). Data analysis included 185 adult female camels for testing differences between types and 438 of all animals to derive growth curves.

The adult height at the withers of a female camel was 170 cm of which it reaches 98% by the age of 5. The growth of body length continued apparently longer (until the age of 10 years) than the growth of height at the withers. Dimensions of the adult camels were found to be as follows average (of both sexes) height at the withers 170 cm (SD 9), rump length 131 (SD 10), estimated weight 275 kg (SD 38). The very low estimated weight, compared to literature can be attributed first to the small adult body size of the camels and secondly the study period at the end of the dry season which displayed generally the lowest weights for the whole year. Significant differences ( $p < 0.05$ ) in adult body dimensions between the four types could only be found in two parameters. Coitte type camels were significantly taller in height at the withers and breast width of Coitte was narrowest and Godan type camels broadest. The question whether there was a difference in condition between the four subtypes could be answered positively when using BCS to assess the condition. Hump circumference as a parameter to describe condition differentiated 3 of the four types significantly ( $p < 0.05$ ). Other factors which could have had an impact on condition like fodder availability at the grazing site, location of measuring site, clan of the owner, satellite or homestead herd and herd itself did not have a significant impact on condition ( $p < 0.05$ ).

The present results of phenotypic breed characterisation, growth curves and detected type differences. All data were field data and therefore reflect the common husbandry conditions for this breed of camel closely. Feedback seminars confirmed the relevance of the data and added further hints of causal explanation.

## ZUSAMMENFASSUNG

Trotz der großen Bedeutung von Kamelen in den ariden Gebieten Afrikas gibt es bislang wenige Untersuchungen zur Rassebeschreibung dieser Kamele. Die vorliegende Studie hatte das Ziel, die Rasse 'Rendille Kamel' in Bezug auf Größe, Größenwachstum, Gewicht, Gewichtsentwicklung und Anpassung an Dürre (Körperkondition am Ende der langen Trockenzeit) zu charakterisieren. Bei adulten Tiere wurde darüber hinaus untersucht, ob die Typen sich in Bezug auf Körpermaße und Körperkondition unterscheiden. Der Schwerpunkt lag hierbei auf der Verwendung von Parametern welche im indigenen Kontext relevant sind und angepaßter Methoden für die Datenerhebung im Feld. Die Untersuchung wurde mit Rendille Pastoralisten im Marsabit Distrikt im Norden Kenias durchgeführt. Die Landwirtschaft dieser Region basiert weitgehend auf pastoraler Weidehaltung. Die wichtigsten Nutztiere dabei sind Kamele, Rinder, Ziegen und Schafe, wobei das Kamel traditionell von herausragender Bedeutung ist.

Im Untersuchungszeitraum von Juli bis Oktober 2003 wurden 461 Tiere vermessen und weitere Informationen von deren Hirten gesammelt. Die Daten umfaßten biometrische Messungen, Konditionsparameter, allgemeine Informationen über das Tier sowie dessen Abstammung und Body Condition Scores (BCS). In die Datenanalyse wurden 185 weibliche Tiere zur Typdifferenzierung einbezogen und 438 Tiere zur Erstellung von Wachstumskurven.

Die adulte Körperhöhe am Widerrist lag bei 170 cm, wovon 98% im Alter von 5 Jahren erreicht waren. Die Zunahme der Rumpflänge setzte sich länger als das Höhenwachstum fort (bis zum Alter von 10 Jahren). Die durchschnittlichen Körpermaße der adulten Tiere waren wie folgt Widerristhöhe: 170 cm (SD 9), Rumpflänge 131 cm (SD 10) und geschätztes Gewicht 275 kg (SD 38). Das sehr niedrige geschätzte Gewicht im Vergleich zur Literatur kann der kleinen Körpergröße und dem Untersuchungszeitraum am Ende der Trockenzeit, dem typischerweise das Körpergewicht am niedrigsten ist, zugeschrieben werden. Signifikante Unterschiede ( $p < 0.05$ ) in den Körpermaßen der adulten Tiere konnten nur für zwei Parameter bestätigt werden: Widerristhöhe und Brustumfang. Coitte Kamele waren signifikant schmaler in der Brust und hatten eine höhere Widerristhöhe als die anderen Typen, wohingegen Kamele des Godan Typs signifikant breitere Brüste hatten als die anderen Typen. Die Frage, ob es Unterschiede in der Körperkondition zwischen den Typen gibt, konnte positiv beantwortet werden wenn BCS zur Ermittlung der Kondition verwendet wurde. Der Höckerumfang als Maß zur Unterscheidung der Typen differenzierte 3 der 4 Typen signifikant ( $p < 0.05$ ). Andere mögliche Einflußfaktoren auf die Kondition wie Futtermenge, Ort der Messungen, Clan des Besitzers, mobile oder Milchherde, oder Herde an sich hatten keinen signifikanten Einfluß auf die Kondition ( $p < 0.05$ ).

Das Ergebnis der Rassecharakterisierung anhand des Phänotyps, von Wachstumskurven und Typunterschieden basiert ausschließlich auf Felddaten und gibt daher die tatsächliche Haltungssituation dieser Kamelrasse wieder. Feedback Seminare mit den Pastoralisten bestätigten die Relevanz der Daten im lokalem Kontext und gaben darüber hinaus weitere Hinweise zu den logischen Zusammenhängen.