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Department of Animal Science, Faculty of Agriculture, Obafemi Awolowo University, Ile-Ife, Nigeria

SIMISOLA M. ODEYINKA

Feeding behaviour and diet selection by West African Dwarf Goats (short communication)

Summary

Sixteen West African Dwarf Goats (WADG) were used to study the feeding behaviour and diet selection. The animals were offered freshly cut stems with leaves and fruiting bodies of *Gliricidia sepium, Leucaena leucocephala* and *Panicum maximum*. The feeding behaviour of the goats was observed and recorded whilst the preference of the animals for each diet was also monitored. Data were collected on feed intake, number of bites per minutes, and preference for each of the forages. The data on feed intake were subjected to one-way analysis of variance. Within 30 minutes into the feeding period, it was observed that the goats concentrated on *Leucaena leucocephala* which they struggled over for favoured positions leading to horn locking. The animals first smelt the different plants took a bite before concentrating on a particular forage. The animals usually consumed fruiting bodies and leaves of leucaena before eating the other two forages. The mean number of bites per goat per minute was 10, 8 and 6 for gliricidia, leucaena and panicum respectively. The animals exhibited bi-pedal stance during feeding.

Analysis of variance showed forage intake to be significantly different ($P< 0.05$) among the forages. Proximate analysis of the three forages indicated that leucaena had a higher quantity of dry matter (DM), crude protein (CP) and ether extract. (EE) compared to the other two forages, while panicum had higher CF, lower CP, ash and EE content compared to gliricidia and leucaena.

Key Words: feeding behaviour, diet selection, WAD goats

Zusammenfassung

Titel der Arbeit: **Freßverhalten und Futterauswahl bei Westafrikanischen Zwergziegen** (Kurzmitteilung)

An 16 Westafrikanischen Zwergziegen wurde deren Freßverhalten und die Pflanzenauswahl untersucht. Den Tieren wurde blätter-und früchtetragendes Frischfutter von *Gliricidia sepium* (Gs), *Leucaena leucocephala* (Ll) und *Panicum maximum* (Pm) angeboten. Erfaßt und varianzanalytisch ausgewertet wurden aufgenommene Futtermenge und Bissen pro Minute beim Verzehr aller drei Pflanzenarten. Innerhalb der 30 minütigen Fütterungsperiode berochen die Ziegen zunächst die drei Pflanzenarten, nahmen einen Bissen und konzentrierten sich dann auf die Aufnahme von Ll, bevor die anderen Pflanzenarten aufgenommen wurden. Bei Ll wurde die signifikant höchste Futteraufnahme je Woche ermittelt. Die durchschnittliche Anzahl von Bissen pro Minute betrug bei Gs = 10, Ll = 8 beziehungsweise bei Pm = 6. Bei den Inhaltsstoffen der untersuchten Futterpflanzen bestanden signifikante Unterschiede. Die Futteranalyse ergab für Ll, verglichen mit den zwei anderen Futterstoffen, einen signifikant geringeren Gehalt an Rohfaser und einen hohen Rohproteinanteil, während z. B. Pm bei hohem Rohfaseranteil einen geringeren Rohprotein- und Rohfettgehalt aufwiesen.

Schlüsselwörter: Freßverhalten, Futterauswahl, Westafrikanische Zwergziege

Introduction

In Nigeria, goats and sheep contribute about 30% of the total meat consumption. The goats in Nigeria represent an important source of meat and the demand for goat meat is

very high especially in rural areas where it often commands higher market price than beef. They are indispensable in religious and customary rites (GETU et al., 1994) and are insurance against crop failure (MATTEWMAN, 1980). Nevertheless, goat production is severely limited by inadequate nutrition especially during the dry season when there is a decline in the yield and quality of forages.

The WAD goats are predominantly indigenous breeds found in southern Nigeria. Feed alone makes up a large part of the cost of producing the ruminant livestock. Traditionally, the goats subsist on grasses, household and farm wastes. *Leucaena leucocephala* and *Gliricidia sepium* are two leguminous browse plants that were introduced to rural livestock owners in southern Nigeria to combat the problem of the decline in yield and nutritive value of grasses. *Gliricidia sepium* and *Leucaena leucocephala* almost retain their yields and nutritive values all the year round (TENIOLA, 1990). *Panicum maximum* is a common grass in this region that is usually available and offered to West African Dwarf goats. The aim of the study was to determine the preference of WAD goats for these forages and to observe their feeding behaviour.

Materials and Methods

At the Obafemi Awolowo University Teaching and Research Farm, most paddocks consist of leucaena, gliricidia and panicum. These are tropical forages known to be of medium to good quality to most ruminants. Freshly cut *Gliricidia Sepium, Leucaena leucocephala* and *Panicum maximum* were offered to the WAD goats. The weights of the offer were taken before the animals were allowed to start eating and the weights of the residues collected daily for each of the forages were also determined. The forages were tied in bulk to the wooden frame of the experimental house, three of each type at three different locations for each of the forages making a total of nine spatially arranged locations of the three forage types:

Leucaena------> Gliricidia ----------> Panicum
Panicum -------> Gliricidia ----------> Leucaena
Gliricidia -----> Panicum ----------> Leucaena

The position of the forages were changed daily

Sixteen West African Dwarf goats were used for the experiment which lasted six weeks. The experiment started on the (15th of November, 1997 to 31st December, 1997) in the experimental house located at the goat unit of the Obafemi Awolowo University Teaching and Research farm, Ile-Ife, Nigeria. Cool clean water was provided in drinking bowls for the goats.

The animals were allowed to eat for one hour fifteen minutes (1hr. 15mins), after which the goats were taken back to their metabolic crates. Twine was used to tie the feeds instead of feeding bowls to avoid `cues' and fighting and to provide something close to a natural environment.

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Percentage of time during the one hour fifteen minutes period in standing versus biting, ruminating and idle times were determined by keen observations at five minutes interval for one month. The time it took to completely consume leucaena leaves and start peeling the stem was carefully observed. Data were collected on feed intake, number of bites per minutes, quantity of forage offered and residues. The data were subjected to one-way analysis of variance. The proximate components were determined using the methods of AOAC (1975).

Results and Discussion

On exposure to the diets, the WAD goats first of all smelt the different forages and took one or two bites from each location of forage stand before concentrating on the most preferred which was leucaena. This could be attributed to the animals organoleptic properties that is, to the presence of chemical substances inherent in some forages that are of eliciting taste or olfactory sensations. The goats struggled for favoured position on leucaena which led to horn locking despite the fact that the feeding area was large enough to prevent clamouring/crowding on a feed stand. Four days into the experiment, they went straight for leucaena without smelling and rarely taking a bite of gliricidia and panicum. The animals on reaching the forage stand consumed the fruiting bodies before the leaves and last of all the stem. This is in agreement with LU (1988), who observed that the fractions which goats most often select are buds, leaves, fruits and flowers and those parts contain less fibre and more protein and are thus more digestible than stems and petioles.

An average of one hour fifteen minutes was spent daily. The goats completely consumed leucaena leaves within 30 mins of feeding after which they concentrated on the other two forages. Some of the animals would prefer to go back to feed on the woody part (stem) and the bark of leucaena before eating the other forages. The goats carefully avoided cut forage that stayed overnight and wilted forage by eating little or nothing from it.

Climbers left on leucaena offered (by chance) were skillfully untouched/avoided. This shows that with increasing feed type offered, quality rather than quantity starts to dominate the animals search for food. Also, the preference is also dependent on the environmental conditions in which the decisions are made (CRAWLEY, 1983; DUMANT et al., 1995).

The WAD goats seemed to enjoy standing on their hind legs, resting their forelegs on the forage (a bi-pedal stance while eating). At a stage when eating, the goats made a funny sound and walked leisurely from one storage stand to the other eating with less interest. At about an hour of eating, the animals were quiet, their chewing sound alone was heard. Also less horn-locking and a characteristic sound was infrequently made.

Table I shows the intake of the three forages by WAD goats. They consumed significantly higher leucaena than the other two forages. 18.0, 48.0 & 27.0kg/week for gliricidia, leucaena and panicum respectively. The smaller size leaves appeared to be more acceptable to WAD goats as compared to the long leaves (Table 1). Table 1

shows it takes longer time for the goats to chew and ingest the leaves of panicum than it takes to chew and ingest those of gliricidia and leucaena. Also, the number of bites per minutes was highest for leucaena and lowest for Panicum, which is in agreement with the work of STOBBS (1973).

Table 1
Mean Forage Intake (Kg/wk) and mean number of bites per goat per minutes (Durchschnittliche Futteraufnahme und durchschnittliche Anzahl Bissen pro Ziege und pro Minute)

	Gliricidia sepium	*Leucaena leucocephala*	*Panicum maximum*
Mean/week	$18^{c} \pm 0.8$	$48^{a} \pm 2.5$	$27^{b} \pm 1.3$
Mean number of bites per goat per minute	10 ± 1.7	8 ± 1.1	6 ± 0.41

Table 2 shows the proximate components of the forages. Leucaena had higher crude protein and ether extract compared to gliricidia and leucaena. This might be responsible for the higher intakes of leucaena. After completely consuming leucaena, they moved to gliricidia taking more bites than for panicum. This is in agreement with the work of PARSONS et al. (1994) and THORNLY et al. (1994) which attributed forage intake to nutrient composition.

Table 2
Chemical Composition of The Forages (DM) (Chemische Zusammensetzung des Futters)

%	*Gliricidia sepium*	*Leucaena leucocephala*	*Panicum maximum*
Crude Fibre	16.8	9.8	28.2
Crude Protein	18.1	23.1	8.4
Ether Extract	8.9	3.7	1.4
Ash	3.2	6.9	4.6
Nitrogen Free Extract	53.0	56.6	57.4

The animals consumed the bark of leucaena after finishing its leaves despite the availability of gliricidia and within their reach. This indicates that WAD goats select stem components and this is in agreement with the report of ADEMOSUN and KOLADE (1973) and STOBBS (1973). The physical appearance of the forages and presence or absence of hairs/thorns could contribute to the goats' feeding behaviour and diet selection since the three forages are visibly different in appearances. Gliricidia is dull green and succulent, leucaena is glossy green while panicum is pale green and hairy. This is in agreement with the report of ZEMMELINK (1980). The bi-pedal stance also enabled the goats to reach and selectively eat the fruiting bodies and fresh leaves at the upper part of the plant.

It can be concluded from the results of this study that the nutrient composition of the forage has a positive effect on the feeding behaviour and diet selection of the WAD goats. Leucaena being the most preferred of the three forages, its greater use should be encouraged taking into consideration its mimosine toxicity.

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References

ADEMOSUN, A.A.; KOLADE, J.O.Y.:
Nutritive Evaluation of Nigerian forages. A comparison of the chemical composition and nutrition and nutritive value of two varieties of cynodon. Nigerian Agric. Journal **10** (1973), 160-169

A.O.A.C.:
Association of Official Analytical Chemists. Official methods of analysis (12th Edition). Washington, D.C., 1975

CRAWLEY, M.J.:
Herbivory: The dynamics of animal and plant interactions. Oxford, Blackwell Scientific Publications. 1983

DUMANT, B., MEURET, M.; PRUDHAN, M.:
Direct observations of biting for studying grazing behaviour of goats and Illamas at garrine range lands. Small ruminant research **16** (1995), 27-35

GEFU, J.O.; ADU, I.F.; ALAWA B.I.; MAGAJI, S.O.:
Characteristics of small holder sheep and goat management practices in South East Nigeria; Nigeria; Nigeria Journal of Animal Production **21** (1994), 127-135

LU, C.D.:
Grazing behaviour and diet selection of goats. Small Ruminant Res. **1** (1988), 205-216

MATTEWMAN, R. W.:
Small ruminants production in the Humid Tropical Zone of Southern Nigeria. Tropical Animal Health Production **234** (1980), 242

PARSONS, A.J.; NEWMAN, J.A.; PENING, P.D.; HARVEY, A.; ORR, R.J.:
Diet preference of sheep: effects of recent diet, physiological state and species abundance. Journal of Animal Ecology **63** (1994), 465–478

STOBBS, T.H.:
The effect of plant structure on the intake of tropical pastures 1. Variations in bite size of grazing cattle. Australian Journal of Agric Res. **24** (1973), 809-819

TENIOLA, S.M.:
The assessment of the nutritive value of *Gliricidia sepium* and *Leucaena leucocephala*. Ph.d Thesis, Obafemi Awolowo University, Nigeria. 1990

THORNLY, J.H.M.; PARSONS, A.I..; NEWMAN, J.A.; PEUING P.D.:
A cost benefit model of intake and selection in a two species sword. Functional Ecology. **8** (1994), 516

ZEMMELINK G.:
Effect of selective consumption on voluntary intake and digestibility. Centre for Agricultural Publishing and documentation, Wageningen. 1980

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Author's address
SIMISOLA M. ODEYINKA, Ph.D
Department of Animal Science
Faculty of Agriculture
Obafemi Awolowo University
Ile-Ife
Nigeria

E-Mail: sodeyink@oauife.edu.ng

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Buchbesprechung

Exterieurbeurteilung landwirtschaftlicher Nutztiere

GOTTFRIED BREM (Hrsg.)

317 Seiten, 26 Tabellen., 162 Farbfotos, 153 Zeichnungen, Verlag Eugen Ulmer, Stuttgart, 1998, ISBN 3-8001-43720, 158,00 DM; 1153,00 ÖS; 141,00 SFr

Moderne Zuchtwertschätzverfahren sowie Gen- und Reproduktionstechniken haben in diesem Jahrhundert die tierzüchterische Denk- und Arbeitswelt maßgeblich verändert. Das dieser Buchtitel von einem Autor, der neben seinem züchterischen Engagement zu den führenden Molekularbiologen zählt, herausgegeben wurde, spricht für die Verantwortung moderner Tierzuchtwissenschaft, die trotz elektronischer und gentechnischer Revolution, das Tier immer als Ganzes betrachtet, seinem Interieur aber auch mit seinem äußeren Erscheinungsbild. Der Herausgeber und die der wissenschaftlichen und praktischen Tierzucht eng verbundenen, kompetenten Autoren sehen in den historischen Stufen der Tierbeurteilung „Farbe, dann Form, dann Leistung", die temporär auch zu unsinnigen Auswüchsen führte, keine Gegensätze, sondern eine sinnvolle, zweckmäßige Kombination und vermitteln diese Erkenntnis.

So liegt dankenswerter Weise mit diesem Titel seit Jahrzehnten für den deutschsprachigen Raum ein Buch über moderne Tierbeurteilung vor. Vordergründiges Ziel ist nicht die Nutzung der Tierbeurteilung für klassisch, formalistische Zwecke, sondern Tierbeurteilung als unverzichtbarer Bestandteil bei der Tierauswahl zur Bewertung von Gesundheit und Leistungsbereitschaft und zum Zuchtausschluß von Tieren mit äußerlich erkennbaren, nutzungsbeschränkenden Mängeln. Das Buch verdeutlicht, daß trotz der enormen Fortschritte der quantitativen Genetik die Tierbeurteilung ein essentieller Teil züchterischer Arbeit und Entscheidung bleibt. Es erfüllt in seiner Komplexität ein seit langem bestehendes Bedürfnis aus der praktischen Tierzucht, es vermittelt sowohl moderne theoretische Grundlagen der Tierbeurteilung als auch die speziellen Zusammenhänge der Exterieurbeurteilung bei den verschiedenen Nutztierarten. Dargestellt wird auch, daß die teilweise Umstellung von Merkmalen auf lineare Beschreibungen, über moderne populationsgenetische Verfahren, optimal für die Selektion genutzt werden können. Die Fülle der angebotenen Detailinformationen erleichtern sowohl dem erfahrenen als auch dem lernenden Tierbeurteiler das Erkennen von Zusammenhängen zwischen Gesundheit und Nutzleistung oder die Optimierung der für rassespezifische Leistungen notwendigen Körperform.

Der erste Hauptteil des Buches beschreibt die allgemeinen Grundlagen. Genannt seien die Unterabschnitte: Nutztier und Rasseentwicklung, Geschichte der Tierbeurteilung, Anatomische und funktionelle Grundlagen, Haustierfarben, Exterieurbeurteilung in der praktischen Tierzucht sowie Ziele, Begriffe und Definitionen. Der zweite umfangreichere Teil widmet sich den speziellen Fragen der Beurteilung bei den Tierarten Pferd, Rind, Schaf, Ziege, Schwein, Kaninchen und Geflügel.

Dieses hervorragend ausgestattete, didaktisch gut aufbereitete Buch vermittelt das zum Erlernen und Vertiefen der Exterierbeurteilung von Nutztieren notwendige theoretische Grundwissen sowie Spezialkenntnisse und stellt eine unverzichtbare Übungshilfe dar. Beurteilen heißt vergleichen, daher wird für diesen Zweck das Anliegen des Buches in vorzüglicher Weise durch sehr zahlreiche Abbildungen und Zeichnungen unterstützt. Dieses, in der Tierzuchtliteratur des deutschsprachigen Raumes, einzige Standardwerk moderner Exterieurbeurteilung wendet sich an Tierzüchter, Veterinärmediziner, Praktiker und Auszubildende und bedarf eigentlich keiner besonderen Empfehlung.

ERNST RITTER, Dummerstorf