Feed utilization and live weight gain by the African giant rat (*Cricetomys gambianus* Waterhouse) at Dschang in Cameroon.

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Summary

A study was carried out with twenty untamed African giant rats (Cricetomys gambianus *Waterhouse) that were fed four rations with graded levels of crude protein (10.7, 13.1, 14.9 and 15.5 percent) for 8 weeks in individual cages in a completely randomised design. Dry matter intake ranged from 24.88 to 27.07 g per day. Daily dry matter and crude protein intake increased as the level of crude protein in the ration was raised but differences between treatment were not significant. Similarly, there were no significant differences between treatment when dry matter, organic matter, and crude protein digestibilities were considered. Daily live weight gain was low in all treatments (1.71 to 3.25 g per day) with no significant differences between them.*

Résumé

Une étude a été menée avec une vingtaine de rats sauvages de Gambie (Cricetomys gambianus *Waterhouse), nourris à base de quatre rations à taux croissant de protéines brutes (10.7, 13.1, 14.9 et 15.5 pourcent) pendant une durée de huit semaines dans des cages individuelles. Le dispositif expérimental était du type bloc complètement aléatoire. La consommation journalière de la matière sèche variait de 24,88 à 27,07 g par jour. La consommation journalière de la matière sèche et protéine brutes augmentait avec l'accroissement du niveau de protéine brute dans la ration mais la différence entre les traitements n'était pas significative. De même, les différences en digestibilité de la matière sèche, de la matière organique et de la protéine brute n'étaient pas significatives. Les gains journaliers en poids vif étaient faibles pour tous les traitements (1,71 à 3,25 g par jour); mais les différences n'étaient pas significatives.*

Introduction

Wildlife provides a non-negligible source of animal protein to most rural populations in Cameroon. Unfortunately, little attention has been given to the wildlife sector especially as a source of animal protein. In recent years, several schemes have been initiated on the domestication of the African giant rat (*Cricetomys gambianus* Waterhouse) in Nigeria (3) and Zaire (9), which provide a basis for future investigations on this rodent as a source of protein. The African giant rat is accepted as a protein source in many African countries (1, 6, 9). It may also be a useful laboratory animal for nutritional clinical and pharmacological research. The object of the present study was to evaluate fed utilization and weight gain by the African giant rat feed rations with graded levels of crude protein.

Materials and Methods

Twenty untamed African giant rats ranging from 886 to 1062 g were purchased from peasants in Dschang in January 1986 and quarantined in individual cages for 3 months before the study started. During the quarantine period, the diet of the animals consisted of bread, sweet potatoes, avocado pears and raw peanuts. After the quarantine period, the animals were randomly allocated into four groups of five each such that each group represented a treatment in a completely randomised design. All animals were maintained in individual cages and provided feed and water *ad libitum*. Four experimental rations were compounded from a combination of ground maize, sweet potato flour, fish meal and commercial mineral/vitamin mixture to contain the following crude protein contents: -10.7, 13.1, 14.9, 15.5%. The composition of the rations is indicated in Table I and II. The daily ration of 50 g of feed was provided to each animal every morning at 08.00 hours after the residue of the previous day's feed had been weighed.

TABLE 1

Proportion of various ingredients in experimental rations

	RATIONS			
Ingredients (%)	A	B	C	D
Maize	45	45	42	40
Groundnut meal	20	20	20	20
Sweet potato flour	25	17	14	10
Dried fish meal	3	7	12	18
Powdered milk	5	9	10	10
Mineral/vitamin mixture	1	1	1	1
Sodium chloride	1	1	1	1
TOTAL	100	100	100	100

TABLE 2

Chemical Composition of Rations

	RATIONS			
Composition (%)	A	B	C	D
Dry matter	91.80	92.05	91.18	91.93
Ash	3.80	3.37	4.94	5.00
Crude Protein	10.72	13.07	14.99	15.47
Ether Extracts	11.82	11.24	14.15	14.22
Crude Fibre	4.98	7.79	3.97	4.14
Nitrogen-Free Extracts	69.68	64.53	61.95	61.17

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An adjustment period of one week was observed before the 8 weeks experimental period commenced. Animals were weighed weekly during the experimental period. During the last four days of the experimental period faecal samples of all animals were collected every 24 hours for evaluation of the digestibility of various experimental rations. Faecal samples were dried in a laboratory oven at 60°C for 48 hours after which they were ground and preserved in airtight sample bottles for chemical analyses. Feed and faecal samples were analysed for dry matter, ash, crude protein, crude fibre, ether extracts and nitrogen free extracts according the AOAC (4) methods.

Total digestible nutrients (TDN) intake by experimental rats were estimated using the following formula:

TDN = DCP + DCF + DNFE = 2.25 (DEE)

Where TDN = Total Digestible Nutrients
DCP = Digestible Crude Protein
DCF = Digestible Crude Fibre
DEE = Digestible Ether Extracts
DNFE = Digestible Nitrogen Free Extracts

From TDN values corresponding digestible energy (DE) intake values were estimated by multiplying by 4.4 Kcal (lg TDN = 4.4 Kcal).

Statistical analysis of data was carried out according to the procedures of Steel and Torie (10) for analysis of Variance for a completely randomised design while significant differences between treatment means were determined using the Duncan's multiple range test.

Results and Discussion

Results of feed intake, digestibility and live weight gain by African giant rats are shown in Table III. Dry matter intake ranged from 24.88 to 27.07 g/day. They were no significant differences between treatments despite the numerical differences. However, dry matter intake increased as dietary protein level was raised. Dry matter intake by African giant rat in this investigation is lower than the range of 30.9 to 36.3 g/day for the same species weighing between 1000 to 1200 g reported from Nigeria (3) using diets with similar crude protein range. The low intake may probably be due to the higher crude fibre content in the present rations (3.97 to 7.79%) as against 1.5 to 2.7% used in Nigeria. Reductions in dry matter intake by African giant rats occur especially if crude fibre content exceeds 10%. However, a tolerance of up to 15% crude fibre level by giant rats has also been reported (7). The trend in organic matter intake tended to increase with increasing dietary crude protein level. Increasing dietary crude protein content from 10.7 to 13.1 increased crude fibre intake from 1.21 to 1.98 g/day. Any further increase in dietary crude protein content did not improve crude fibre intake.

Dry matter digestibility ranged from 87.16 to 90.01 percent. Differences between treatments were not significant. Similarly, there were no significant differences between treatments as regards organic matter and crude protein digestibility. They increased with increasing dietary crude protein level. Dry matter digestibilities obtained in this study are higher than those reported in Nigeria (8) probably as a result of a higher content of more digestible carbohydrate in rations. The crude fibre component has an important negative influence on digestibility of other feed constituents since unbroken cell walls (containing hemicellulose, cellulose and lignin) prevents access of digestive enzymes to cell contents. Increase in crude fibre content in may feeds by 1 percent unit causes a reduction in digestibility of total nutrients by 0.7 to 1.0 unit for ruminants. This value is higher for monogastric species. The stage of maturity influences digestion and utilization of some nutrients. Rats used for this investigation were almost mature, unlike weaned rats used in the Nigerian studies (8). The improvement in the efficiency of nutrient digestibility in mature rats is related to changes in the quantity of enzymes secreted into the gastro-intestinal tract. Thus the tendency to cope with less digestible components of the ration improves with maturity. There were no differences between treatments as regard TDN or digestible energy intake. Daily weight gain tended to decline with dietary crude protein level. It is however worth noting that 50 percent of the rats used in the experiment had attained adult weight (1000 and 1500 g for females and males respectively) such that appreciable weight gains by younger rats was diluted by adults that were virtually no longer growing. Low feed intake could also have contributed to slow growth rate. The balance of amino acids in rations could also influence feed intake and growth but is not addressed in the investigation. Babatunde and Fetuga (5) reported that methionine deficiency in chicken diets not only depressed feed intake but also growth. This could be the case in the present study.

TABLE 3

Feed intake digestibility and live weight gain by African giant rats (*Cricetomys gambianus*)

	TREATMENTS			
	A	B	C	D
Initial Liveweight (g)	962 ± 153	1026 ± 112	1062 ± 136	886 ± 83
Final Weight (g)	1144 ± 77	1146 ± 32	1158 ± 91	994 ± 75
Live Weight change (g)	182 ± 94	122 ± 85	96 ± 55	108 ± 48
Average daily gain (g/day)	3.26 ± 1.68	2.18 ± 0.85	1.71 ± 0.21	1.93 ± 0.86
Dry matter intake (g/day)	24.28 ± 6.55	25.41 ± 3.79	25.49 ± 2.76	27.07 ± 27.07
Organic matter intake (g/day)	23.52 ± 2.85	24.55 ± 3.67	24.17 ± 2.62	25.67 ± 2.98
Crude Protein intake (g/day)	2.60 ± 0.32	3.32 ± 0.49	3.82 ± 0.41	4.19 ± 0.49
Crude fibre intake (g/day)	1.21 ± 0.15	1.98 ± 0.29	1.01 ± 0.11	1.12 ± 0.13
Dry matter digestibility (%)	89.16 ± 2.14	87.31 ± 1.38	87.11 ± 0.69	90.01 ± 1.66
Organic matter digestibility (%)	89.67 ± 1.73	88.86 ± 1.24	89.21 ± 0.67	92.61 ± 1.29
Crude protein digestibility (%)	66.81 ± 6.28	71.66 ± 2.96	75.8 ± 11.38	81.30 ± 2.52
TDN intake (g/day)	22.07 ± 6.34	22.56 ± 3.51	21.9 ± 3.02	23.80 ± 4.41
Digestibility Energy Intake (Kcal/day)	97.11 ± 27.89	99.26 ± 15.46	94.56 ± 13.28	104.56 ± 19.39

Conclusion

It is necessary to continue nutritional research on the African giant rat particularly as many young people are raising captured rats in the Dschang area of Cameroon. The Giant rat is a protein source in this region where the human population is generally above 250 per km². Such research should eventually lead to feed packages that can be produced and sold to potential producers.

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