

# Observations Regarding the Duration of Feeding Behaviour when Intensively Farmed Coypus (Nutrias) are Fed with Barley and Carrots

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## Abstract

The studies on coypu behaviour are applied in the development of knowledge regarding ethology, in the coypu-breeding technology, animal welfare and, at the moment, they present great importance for animal protection. The biological material studied was consisted of health adult coypus, belonging to the variety Golden Standard with a similar body mass. The indices supervised were: feeding behaviour duration if coypus are fed with barley and carrots according to gender and time slot, the duration of one feeding sequence according to forage consumed and gender and the number of feeding sequences according to forage consumed and gender. For realising the purposed aim, each coypu was monitorized (video), individually, 24 hours a day. The duration of feeding behaviour when coypus are fed with barley and carrots was  $4507.88 \pm 38.99$  seconds for males (5.21% of the behavioural manifestations), and for coypu females, the duration of feeding behaviour was  $4576.63 \pm 26.01$  seconds (5.29% of the behavioural manifestations). The most intense manifestations of the feeding behaviour took place in the time slots 08:00-14:00 and 14:00-20:00, and the lowest intensity of the feeding behaviour manifestations took place in the time slot 02:00-08:00.

**Keywords:** coypu, feeding behaviour, intensive system.

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## 1. Introduction

Now, few European scientists are especially studying the coypus behaviour in order to develop an improved breeding technology for these types of animals, technologies that will lead to increase the coypus production performance.

In Romania, the first researches on the feeding, hygienic and resting behaviour of the intensively farmed coypu were carried out by Bura, Rebreanu, Radulescu and Tosca in 1985.

The studies on coypus behaviour are applied in the development of knowledge regarding ethology, in the coypu-breeding technology, animal welfare

and, at the moment, they present great importance for animal protection ensuring.

The main purpose of this work is to highlight the main feeding behaviour features if intensively farmed adult coypus are fed with barley and carrots.

## 2. Materials and methods

The experiments were performed at the Experimental Didactic Station, Farm 9 "Green Forest", in the rabbits and coypus – breeding sector, within Banat's University of Agricultural Sciences and Veterinary Medicine Timișoara.

Biological material studied consist of healthy adult coypus (*Myocastor coypus*), belonging to the Golden Standard (brown Brunellis) variety, with a similar body mass.

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The researches have been performed on a total of 16 gentry (8 females and 8 males) in the cold season. Duration of the experiment was 18 days. In the first 2 days, the coypus were accustomed with barley and carrots.

Monitoring of biological material was individually (for each stall separately) 24 hours a day, through a video camera. Video recordings took place over a period of 16 days, totalling 384 videotaped hours. The recording of the experimental data obtained was performed with a video camera (Sony CCD-TRV98E Hi8-VHSPAL) which was placed in the shelter where the experiments were carried out. Video data were stored using a video cassette recorder (Sony - SLV-SE410K-VHSPAL) on videotapes of 16 mm (Maxell - E-180M-VHSPAL) [2, 3]. This was possible because the camera was connected via a TV / VCAR when recorded.

The amount of forage given during the experiment was: 100 g barley / day / gentry and 300 g carrots/ day / gentry.

To achieve its intended purpose have been used a total of 16 stalls arranged in two rows (8 stalls in a row and 8 stalls on another row) in the first half of the shelter with the number 1.

The maintenance stall has the following characteristics: 1.5 m length, 1.2 m width and 0.95 m height.

Given that climatic factors have a major implication in behavioural manifestations, the microclimate conditions were monitored. Thus, during the experiments was determined, using the equipment for this aim, the following physical parameters of shelter: air temperature, water temperature from water tank, air relative humidity, air streams speed and brightness.

Average values of the monitored physical factors (air temperature, water temperature from water tank, air relative humidity, air streams speed and brightness) during the experiments in the experimental shelter are presented in Table 1.

**Table 1.** Average values for physical factors (microclimate conditions) monitored in the experimental shelter

Season	Physical Factors				
	Air Temperature (°C)	Water Temperature from Water Tank (°C)	Air Relative Humidity (%)	Air Streams Speed (m/s)	Brightness (lx)
Cold	9.00±0.28	8.91±0.14	80.73±0.14	0.074±0.016	172.71±14.68

During the experiment the following indices were monitored:

- the duration of the feeding behaviour according to consumed feed, gender and time slot;
- the duration of one feeding according to consumed feed and gender;
- number of feedings according to consumed feed and gender.

### 3. Results and discussion

In Table 2 are shown the average values and dispersion indices regarding the feeding behaviour duration if coypus are fed with barley and carrots in 24 hours.

The data presented in the table shows that the average regarding the total duration of feeding behaviour for coypus male was 4507.88 ± 38.99 seconds, while for coypu female the average regarding the total feeding behaviour was 4576.63 ± 26.01 seconds.

**Table 2.** Average values and dispersion indices regarding feeding behaviour duration (seconds) if coypus are fed with barley and carrots in 24 hours

Average and dispersion indices	Males		Females		Total time	
	barley	carrots	barley	carrots	males (barley + carrots)	females (barley + carrots)
n	8		8		8	8
X	2710.13	1797.75	2697.75	1878.88	4507.88	4576.63
Sx	14.12	40.36	10.79	30.11	38.99	26.01
s	39.97	114.23	30.53	85.20	110.35	73.60
CV	1.47	6.35	1.13	4.53	2.45	1.61
Sx%	0.52	2.24	0.39	1.60	0.86	0.56
Val. min.	2667	1616	2657	1680	4283	4398
Val. max.	2753	1920	2744	1934	4593	4619

*n* – numbers of specimens; *x* – mean; *S* – standard deviation; *Sx* – medium mean error; *CV* – variability coefficient; *val. min.* – minimum registered value; *val. max.* – maximum registered value.

Analyzing the coefficient of variability in terms of the total duration of coypus feeding behaviour observed that both, males and females, was a small variability (CV = 2.45% for males and CV = 1.61% for females).

For males, the average duration of barley consumption in 24 hours was  $2710.13 \pm 14.12$  seconds, while the average duration of carrots consumption was  $1797.75 \pm 40.36$  seconds.

Analyzing the coefficient of variability of males on the duration of barley and carrots consumption, it is noted that the variability was low for both, consumption of barley (CV = 1.47%) and for consumption of carrots (CV = 6.35%).

For females, the average duration of barley consumption in 24 hours was  $2697.75 \pm 10.79$  seconds, while the average duration of carrots consumption was  $1878.88 \pm 30.11$  seconds.

Analyzing the coefficient of variability of females in terms of time consumption of barley and carrots, it is noted that the variability was low in both cases (CV = 1.13% barley, CV = 4.53% carrots).

The duration of feeding behaviour, when coypus are fed with barley and carrots, represent 5.21% in 24 hours for males and for females the duration of feeding behaviour is 5.29% in 24 hours.

Analyzing the feeding behaviour duration for intensively farmed coypus according to forage type consumed, was found that for coypu males 60.119% of the average total time allocated for feeding behaviour is assigned for barley consumption and the percentage remaining 39.880% is the percentage time allocated for carrots consumption.

For coypu females, 58.946% of the average duration allocated for feeding behaviour is assigned for barley consumption, and the percentage remaining 41.053% is the percentage time allocated to carrots consumption.

In Table 3 are shown average values and dispersion indices of feeding behaviour duration in different time slots of the day when coypus are fed with barley and carrots.

For coypu males in 08:00-14:00 time slot, the average total duration of feeding behaviour was  $1447.13 \pm 261.66$  seconds, and for females was  $1489.88 \pm 283.57$  seconds.

Analyzing the coefficient of variability for coypu males and females is clear that the variability is high both for males (CV = 51.17%) and females (CV = 53.86%).

Analyzing the feeding behaviour duration according to the type of forage shows that the average time for barley consumption for coypu males was  $825.88 \pm 167.08$  seconds, while the average duration for carrots consumption was  $621.25 \pm 107.48$  seconds.

For coypu females the feeding behaviour duration according to forage type in 08:00-14:00 time slot was  $848.25 \pm 181.27$  seconds for the consumption of barley and for carrots consumption was  $641.63 \pm 113.51$  seconds.

The coefficient of variability obtained from both males and females according to type of forage was higher (for males CV = 57.25% for barley and CV = 48.96% for carrots, for females CV = 60.48% for barley and CV = 50.06% for carrots).

In the time slot 14:00-20:00, the average total duration of feeding behaviour for males was  $2190.25 \pm 180.16$  seconds, while the average duration of females feeding behaviour was  $2112.38 \pm 203.52$  seconds.

Variability recorded in this case was high both for males (CV = 23.28%) and for females (CV = 27.27%).

Analyzing the feeding behaviour duration according to type of forage in 14:00-20:00 time slot can be observed that males average duration regarding barley consumption was  $1538.63 \pm 125.63$  seconds, and for carrots the average value obtained was  $651.63 \pm 57.51$  seconds.

The average duration of feeding behaviour for coypu females by type of feed in 14:00-20:00 time slot was  $1482.50 \pm 146.34$  seconds for the barley consumption and for carrots consumption the average obtained was  $629.88 \pm 58.94$  seconds.

In the time slot mentioned above we achieved a high variability for males both for time spent on barley consumption (CV = 23.11%) and for time spent on carrots consumption (CV = 24.98%), too. For female the variability was high in both cases (barley - CV = 27.93% and carrots - CV = 26.48%).

The time slot 20:00-02:00 revealed that the average total feeding behaviour duration for coypu males was  $870.50 \pm 186.93$  seconds, while for females was  $974.38 \pm 180.48$  seconds.

By analyzing the coefficient of variability, it is noted that both, for males (CV = 60.77%) and females (CV = 52.42%) the variability is high.

Analyzing the feeding behaviour duration according to forage type in 20:00-02:00 time slot it is noted that the male average duration

regarding barley consumption was  $345.63 \pm 60.79$  seconds, and for carrots consumption the average value obtained was  $524.88 \pm 127.84$  seconds.

The average duration of feeding behaviour according forage type for coypu females in the above mentioned time slot was  $367.00 \pm 58.00$  seconds for the barley consumption and in case of carrots consumption the average obtained was  $607.38 \pm 125.80$  seconds.

The coefficient of variability obtained from both males and females according to type of forage in 20:00-02:00 time slot was higher (for males CV = 49.78% for barley and CV = 68.93% for carrots, for females CV = 44.72% for barley and CV = 58.62% for carrots).

In the 02:00-08:00 time slot there was no manifestation of feeding behaviour because all feed was consumed in the interval 20:00-02:00.

**Table 3.** Average values and dispersion indices regarding the feeding behaviour duration (seconds), for different time slots of the day, if coypus are fed with barley and carrots

Time slot	Average and dispersion indices	Males		Females		Total sequences	
		barley	carrots	barley	carrots	males (barley + carrots)	females (barley + carrots)
08 <sup>00</sup> -14 <sup>00</sup>	n	8		8		8	
	X	825.88	621.25	848.25	641.63	1447.13	1489.88
	Sx	167.08	107.48	181.27	113.51	261.66	283.57
	s	472.83	304.16	513.00	321.22	740.50	802.51
	CV	57.25	48.96	60.48	50.06	51.17	53.86
	Sx%	20.23	17.30	21.37	17.69	18.08	19.03
	Val. min.	44	149	44	149	193	193
	Val. max.	1261	952	1272	964	1969	1987
14 <sup>00</sup> -20 <sup>00</sup>	n	8		8		8	
	X	1538.63	651.63	1482.50	629.88	2190.25	2112.38
	Sx	125.63	57.51	146.34	58.94	180.16	203.52
	s	355.53	162.74	414.14	166.79	509.84	575.97
	CV	23.11	24.98	27.93	26.48	23.28	27.27
	Sx%	8.16	8.82	9.87	9.35	8.22	9.63
	Val. min.	1047	373	1038	431	1420	1472
	Val. max.	2026	797	2042	801	2823	2843
20 <sup>00</sup> -02 <sup>00</sup>	n	8		8		8	
	X	345.63	524.88	367.00	607.38	870.50	974.38
	Sx	60.79	127.84	58.00	125.80	186.93	180.48
	s	172.05	361.77	164.13	356.02	529.01	510.75
	CV	49.78	68.93	44.72	58.62	60.77	52.42
	Sx%	17.58	24.35	15.80	20.71	21.47	18.52
	Val. min.	204	181	204	183	387	387
	Val. max.	600	970	606	973	1569	1579
02 <sup>00</sup> -08 <sup>00</sup>	n	-	-	-	-	-	-
	X	-	-	-	-	-	-
	Sx	-	-	-	-	-	-
	s	-	-	-	-	-	-
	CV	-	-	-	-	-	-
	Sx%	-	-	-	-	-	-
	Val. min.	-	-	-	-	-	-
	Val. max.	-	-	-	-	-	-

*n* – numbers of specimens; *x* – mean; *S* – standard deviation; *Sx* – medium mean error; *CV* – variability coefficient; *val. min.* – minimum registered value; *val. max.* – maximum registered value.

The average values and dispersion indices regarding the duration of one feeding sequence

from feeding behaviour if coypus are fed with barley and carrots are presented in Table 4.

**Table 4.** Average values and dispersion indices regarding the duration (seconds) of one stage (sequence) of the feeding behaviour when coypus are fed with barley and carrots

Average and dispersion indices	Males		Females	
	barley	carrots	barley	carrots
n	195	174	195	165
X	119.41	84.15	110.01	91.05
Sx	10.60	6.87	6.77	7.08
s	147.99	90.67	94.48	90.90
CV	123.94	107.74	85.88	99.83
Sx%	8.87	8.16	6.15	7.77
Val. min.	5	3	5	2
Val. max.	1716	320	465	320

*n* – numbers of specimens; *x* – mean; *S* – standard deviation, *Sx* – medium mean error; *CV* – variability coefficient; *val. min.* – minimum registered value; *val. max.* – maximum registered value.

The average duration of one feeding sequence from coypu males feeding behaviour was  $119.41 \pm 10.60$  seconds for the barley consumption and for carrots consumption the average value obtained was  $84.15 \pm 6.87$  seconds.

Variability in the above case was high both for consumption of barley ( $CV = 123.94\%$ ) and for carrots consumption ( $CV = 107.74\%$ ), for one feeding sequence duration.

For females the average duration of one feeding sequence from the feeding behaviour was  $110.01 \pm 6.77$  seconds for the consumption of barley and for carrots consumption the average value was  $91.05 \pm 7.08$  seconds. Variability regarding the duration of consumption sequences for the two categories of forage was high ( $CV = 85.88\%$  for barley,  $CV = 99.83\%$  for carrots).

In Table 5 are presented the average values and dispersion indices regarding the number of feeding sequences if coypus are fed with barley and carrots in 24 hours.

Analyzing the table above shows that the average total number of males feeding sequences was  $47.75 \pm 2.83$  sequences and the average total number of females feeding sequences was  $45.63 \pm 2.78$  sequences.

Regarding the coefficient of variability can be observed that the variability is mediated both for males ( $CV = 16.78\%$ ) and female ( $CV = 17.26\%$ ), too.

Analyzing the average values and dispersion indices regarding the number of feeding sequences according to gender and type of forage shows the average number of males feeding sequences was  $24.50 \pm 0.94$  sequences for barley consumption and for the carrots consumption the average value for feeding sequences was  $23.25 \pm 2.48$  sequences.

The average number of females feeding sequences for barley consumption was  $23.13 \pm 1.08$  sequences and the average value for consumption of carrots was  $22.50 \pm 2.41$  sequences.

**Table 5.** Average values and dispersion indices regarding the number of feeding reprises when coypus are fed with barley and carrots in 24 hours

Average and dispersion indices	Males		Females		Total sequences	
	barley	carrots	barley	carrots	males (barley + carrots)	females (barley + carrots)
n	8	8	8	8	8	8
X	24.50	23.25	23.13	22.50	47.75	45.63
Sx	0.94	2.48	1.08	2.41	2.83	2.78
s	2.67	7.03	3.04	6.82	8.01	7.87
CV	10.91	30.22	13.16	30.33	16.78	17.26
Sx%	3.85	10.67	4.65	10.71	5.93	6.09
Val. min.	20	17	20	14	41	36
Val. max.	29	35	29	32	64	61

*n* – numbers of specimens; *x* – mean; *S* – standard deviation; *Sx* – medium mean error; *CV* – variability coefficient; *val. min.* – minimum registered value; *val. max.* – maximum registered value.

After Bura et al. (1985), at rest adult coypus have two intense periods in which exercising their feeding behaviour. These periods are in the time slots 9 -10 (13 '02") and 13 -14 (11' 27"). Period with a low activity in terms of feeding behaviour manifestations is in the time slot 15-16 (2 '50"). Analyzing the coefficient of variability calculated for the number of consume sequences shows that if consumption of barley is a medium variability both for males (CV = 10.91%) and females (CV = 13.16%). There was high variability in both males (CV = 30.22%) and females (CV = 30.33%) for sequences number if consumption of carrots.

#### 4. Conclusions

1. The duration of coypu males feeding behaviour if they are fed with barley and carrots is 5.21% of 24 hours, and females feeding behaviour duration is 5.29% in 24 hours.
2. If coypus are fed with barley and carrots, coypu males spent for barley consumption 60.119% of the average total time allocated for feeding behaviour.
3. If coypu females are fed with barley and carrots, 58.946% of the average total time for feeding behaviour is allocated for barley consumption.
4. The most intense manifestations of feeding behaviour if coypus are fed with barley and carrots occurred in 14:00-20:00 time slot.

5. Lowest intensity behavioural manifestations when feeding barley and carrots was recorded between the hours 20:00-02:00.

6. Average total number of males feeding sequences when feeding barley and carrots was  $47.75 \pm 2.83$  sequences and the average total number of females feeding sequences was  $45.63 \pm 3.74$  sequences.

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