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FOOD COMPOSITION AND FEATURES OF THE MUSKRAT'S FEEDING IN THE WATER BODIES OF NORTH KAZAKHSTAN OBLAST

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СОСТАВ КОРМОВ И ОСОБЕННОСТИ ПИТАНИЯ ОНДАТРЫ НА ВОДОЕМАХ СЕВЕРО-КАЗАХСТАНСКОЙ ОБЛАСТИ

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СОЛТҮСТІК ҚАЗАҚСТАН ОБЛЫСЫНДАҒЫ СУ ҚҰБЫРЛАРЫНДАҒЫ ЭЛЕКТР ҚУАТЫН ЖЕТКІЗУШІЛЕРДІҢ ЕРЕКШЕЛІКТЕРІ

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Annotation

Delivery questions of a muskrat on area reservoirs are considered. Results of a research of structure of the consumed forages for various reservoirs are given. It is established that from more than 20 found components main types of forages are only 4 which are noted in 100% of stomachs and occupied from 73 to 100% of its volume. Compliance of the prevailing delivery objects to background species of vegetation on lakes is noted. Main type of forage on reservoirs is typha which on average in all surveyed lakes made 62.3% of total number of the eaten vegetation. Typha and flowering rush are food, almost equally significant for a muskrat; – they made 28.8% and 27.1%, respectively. Other types of forages didn't exceed 21.5%, and animal only 1.2%. The eating facts were noted by a muskrat of animal forage. In particular, in stomachs of 3 individuals fragments of sinks of mollusks and fins of juveniles of fishes are found. The ratio of the consumed forages and weight of small animals is established. Its relation to body weight fluctuates ranging from 2.31 up to 3.76. Approximate calculations of consumption of forages a muskrat during the winter period (7 months) are made showed that one individual during this time consumes not less than 54–55 kg, and family of 5 individuals – 270–275 kg. In too time, efficiency of rhizomes of typha makes about 350–450 kg.

Key words: muskrat, food, feeding, vegetation, cane, food resources.

Аннотация

Рассматриваются вопросы питания ондатры на водоемах области. Приводятся результаты исследования состава потребляемых кормов для различных водоемов. Установлено, что из более чем 20 обнаруженных компонентов основными видами кормов являются всего 4, которые отмечены в 100% желудков и занимали от 73 до 100% его объема. Отмечается соответствие преобладающих объектов питания фоновым видам растительности на озерах. Основным видом корма на водоемах является тростник, который в среднем по всем обследованным озёрам составил 62,3% от общего количества поедаемой растительности. Рогоз и сусак являются практически одинаково значимой для ондатры пищей – они составили 28,8% и 27,1%, соответственно. Другие виды кормов не превышали 21,5%, а животные всего 1,2%. Были отмечены факты поедания ондатрой животного корма. В частности, в желудках 3 особей обнаружены фрагменты раковин моллюсков и плавников молоди рыб. Установлено соотношение потребляемых кормов и веса зверьков. Его отношение к весу тела колеблется в пределах от 2,31 до 3,76.

Сделаны ориентировочные расчеты потребления кормов ондатрой в зимний период (7 месяцев) показали, что одна особь за это время потребляет не менее 54–55 кг, а семья из 5 особей – 270–275 кг. В тоже время, продуктивность корневищ тростника составляет около 350–450 кг.

Ключевые слова: ондатра, питание, корма, растительность, тростник, кормовые ресурсы.

Аңдатпа

Облыс аумағындағы су қоймалардағы ондатрдың тамақтануы туралы сұрақтар қарастырылады. Әр түрлі су қоймалардағы қолданылатын қорек құрамының зерттеу қорытындылары келтірілген. Табылған 20 компоненттердің ішіндегі негізгі 4 қорек түрі болып табылатыны анықталды, оның 100% асқазандарынан анықталды және 73 тен 100% оның көлемін алды. Көлдердердің белгілі бір ая үстіндегі бедердегі өсімдіктердің сйәкестігі байқалды. Су қоймалардағы негізгі қорек түрі қамыс болып табылады, жалпы барлық желінетін өсімдіктер арасынан зерттелген барлық көлдердің ішінде орташа есеппен 62,3% құрады. Қоға және ақшоқанда ондатрдың тәжірибелік маңызы жағынан бірдей қорек болып табылады, осыған сәйкес олар 28,8% және 27,1%, құрады. Қоректің басқа түрлері 21,5% жоғары көрсеткіш көрсеткен жоқ, ал жануар тектес қорек 1,2%. Оған қоса ондатрдың жануарлар қорегін жейтіндігі де анықталды. Жекелей қарастырғанда 3 дарасының асқазанында былқылдақденелілердің қабыршақтарының қалдықтары және жас балықтардың жүзбе қанаттары табылды. Қажет ететін қорек мөлшері және жануарлардың салмағы анықталды. Оның салмағы дене салмағына шаққанда 2,31 дейін 3,76 ауытқиды. Болжамды есеп бойынша, ондатрдың қысқы кезеңде (7 ай) қорек тұтыну мөлшері көрсеткендей, бір дарақ үшін кемінде 54–55 кг тұтынады, ал отбасы 5 дарақ – 270–275 кг. Сонымен қатар, қамыстың тамыр сабақтарының өнімділігі шамамен 350–450 кг.

Түйінді сөздер: мускат, азық– түлік, азық, өсімдік, қамыс, азық ресурстары.

Introduction

North Kazakhstan oblast is a unique area for the habitat of the species. There are about 2700 small and large lakes in the region; they occupy about 4.5% of its area. The lakes have special morphology (gradually sloping shores and shallow depths) and various vegetation, so region is one of the perspective areas in the republic for the extraction of muskrats.

At the same time, in recent years we can see a significant reduction in the number of animals, even in those lakes where they used to be numerous. Considering that the influence of only winter conditions should have an effect on the quantitative indicators of the population of all water bodies in the same way, it can be assumed that other characteristics, such as food resources, also have an impact on the reduction of animal numbers. Feeding conditions (food supply, overpopulation, range damage and consequent starvation) are the most important factor for population regulation and the reason for muskrat population cycling [1, 2, 3]. The authors studied this problem because similar researches were not conducted in the north of Kazakhstan during the last decades [4, 5, 6, 7].

Research methods

The research was conducted on the territories of Mamlyutsky, Kyzylzharsky, Akkayynsky and Zhambylsky districts from spring 2016 to autumn 2017. During this period, more than 15 water bodies were researched. We studed the muskrat‘s food by opening the stomachs of 22 animals. Their contents were preserved in 4% formalin solution and then disassembled into fractions and weighed [8].

Research results

In the lakes, located on the territory of the studying areas, and in the whole area, the prevalence of reed thickets, which occupies up to 80% of surface vegetation, is typical. Although the muskrat is characterized by the monotony of the eaten food, it eats not only cane, but also other plant species growing in the lakes. [9]. When analyzing the role of the plant families in the muskrat’s feeding, it was noted that most of the plants consumed by muskrats in the area are the same (Cyperáceae) (Table 1).

It was found that among more than 20 food components, the main types of food are only 4, which are found in 100% of the stomachs and occupied from 73 to 100% of its volume (umbrella bust – Bútomus umbellátus, Lake Reed – Phragmites australis, narrow– leaved reed – Týpha angustifólia rhizomes of reed and cane). Six objects were found quite often, but in less than 50% of the stomachs (Table 1). Finally, three kinds of food were found only in sporadic individuals, in particular, animal food.

Most of plant species grow on the territory of the reservoir. At the same time, undigested wheat grains (Tríticum) were found in the stomachs of two animals, which inhabited in Lake Golishi and Bozai within the agricultural land in 30–75 meters from the lakes. Consequently, the animal goes ashore and can move away from the water for a long distance (up to 100 m). There is a reason for the muskrat to go away from the habitual environment. In the fall, when all the vegetation on the pond dries out and loses its food properties, animals have to spend more time searching for the necessary food, and wheat at that time is in the stage of ripeness and can use as a valuable protein product.

In addition, there were facts when muskrats eat animal food. In particular, fragments of mollusk shells and fins of juvenile fish were found in the stomachs of 3 individuals. Some animal fragments could not be defined. They made no more than 5–7% of the weight of food mass. Cases of nest building by ducks near the muskrat's hut were observed, but the evidence of eating eggs were not detected.

In October 2017, additional researches were conducted on the territory of Zhambylsky district. As a result of these researches, food characteristics of the muskrat were specified. In particular, researchers defined the most frequent eating of such plants as cane, reed mace and Butomus. The group of common foods should include reed, sedge, white water lily, pod, Potamogéton. Secondary and rarely consumed food are arrowhead, Agrostis alba and Lémna mínor. Muskrats rarely consume animal food: carp, mollusks (Table 2).

Table 1 Plants used by muskrats as food in the territory of the North Kazakhstan oblast in 2017

Plants and their parts	Family	Main food	Normal food	Secondary food
Potamogéton (3 вида)	Potamogetonáceae		+	
Bútomus umbellátus	Butomaceae	+		
Lémna mínor	Araceae			+
Myriophýllum spicátum	Haloragáceae		+	
Agrostis alba	Gramíneae			+
Calamagróstis epigéjos	Gramíneae		+	
Phragmites australis	Gramíneae	+		
Týpha angustifólia	Typhāceae	+		
Schoenoplēctus lacūstris	Cyperáceae		+	
Menyanthes trifoliáta	Menyantháceae		+	
Carex rostrata	Cyperáceae		+	
Rhizomes of reed and cane	Typhāceae	+		
Animal food (4 kinds)				+
Total		3	4	3

The composition of food may vary in different waters. Thus, during the research of Lake Zaymische, it was found that the main type of food here was cane, which accounted for 70.3% of the total amount of eaten food, and the share of reed accounted for 20.8%; other plants accounted for 8.9%. On the lake Shubnoe, the main type of food was the reed, which made up 52.2% of the weight of the stomach contents, other food accounted for 47.8%. On Lake Ponomarevo, the dominant species in the diet were the reed – 38.8% and butomus – 32.7%. On the lake Mogilnoe, the muskrat eats mostly only cane, which accounted for 80.5% of the weight of the food mass.

Table 2 The results of muskrat's food assessing in the water bodies of Zhambyl district in 2017

Lake	The number of animals	The amount of eaten food (kg)	Food in the stomachs (%):				
			cane	reed	Butomus	other plants	animals
Zaymishe	7	0,42	+(70,3)	+(20,8)	–	+ (8,9)	–
Utinoe	5	0,44	+(50,4)	+(6,8)	+(17,2)	+(25,6)	–
Mogilnoe	5	0,57	+(80,5)	–	–	+(25,6)	–
Shubnoe	4	0,34	–	+(52,2)	–	+(47,8)	–
Sosnovoe	6	0,48	+(73,4)	–	+(23,5)	+(2)	+1,1
Velikoe	4	0,42	+(37,2)	+(25,5)	+(17,5)	+(19,5)	–
Ponomorevo	8	0,43	–	+(38,8)	+(32,7)	+(27,2)	+(1,3)
Total	35	0,44	62,32	28,82	27,1	21,5	1,2

From the obtained data, it is possible to state that the main type of food in water bodies is cane; it makes 62.3% of the total amount of eaten vegetation in all researched lakes. Reed and Butomus are almost equally significant for muskrat food – they are 28.8% and 27.1%, respectively. Other types of food did not exceed 21.5%, and animal food is only 1.2%.

The reasons for food selectivity are the predominance of a plant on the pond. In particular, the assessment of the dominant vegetation in the researched reservoirs showed that lake reeds on average occupy about 60–70% of the water area and this figure practically corresponds to the proportion of eaten food. And in winter it is the main food.

We also studied the amount of food eaten by the animals. Research of 17 individuals of muskrats by weighing of animals and their stomachs contents showed that its ratio to body weight ranges from 2.31 to 3.76 (Table 3).

Table 3 The ratio of the volume of food eaten by the muskrat to its body weight (2017)

№	Muskrat's weight	Stomach contents weight, g	The ratio of the muskrat's weight to the weight of the stomach
1	743	220	3,38
2	820	285	2,88
3	540	190	2,84
4	1020	315	3,24
5	657	245	2,7
6	792	287	2,76
7	983	348	2,82
8	548	186	2,95

9	739	250	2,96
10	860	300	2,87
11	684	292	2,34
12	1130	330	3,42
13	775	272	2,85
14	684	246	2,78
15	587	156	3,76
16	940	254	3,7
17	665	288	2,31

Thus, the smaller the indicator, the greater the weight of the stomach contents. The average is about 2.8, which marked 9 animals. There were 6 individuals with a ratio higher or close to 3 and the remaining 2 muskrats had a ratio about 2.3. Based on this analysis, we can conclude that animals with small or medium weight usually eat more food than large individuals.

Estimated calculations of food consumption of muskrats during the winter period (7 months) showed that one individual consumes at least 54–55 kg during this time, and a family of 5 individuals consumes 270–275 kg. At the same time, the productivity of reed rhizomes (Phragmitescommunis), according to our estimates, is about 350–450 kg. Consequently, during the cold period, the animals eat about 61–77% of the rhizomes mass. And this factor can be decisive in limiting the number of animals in the lake, especially if the family consists of 5 individuals.

Discussion

The obtained results, in general, correspond to the data about Kazakhstan given by Strautman E.I. [5]. The exceptions are wheat grains found in the stomachs of animals: it indicates that the animals use not only the water area to collect food, but also the territories around it. Differences in the feeding of muskrats from different reservoirs determined by the use of the predominant groups of plants, it indicates plasticity of animals. At the same time, the study of the food mass consumed by one animal showed that one individual consumes about 54–55 kg of plant mass, mainly rhizomes of reed, for 7 months of the cold period. The family consisting of 5 individuals consumes about 270–275 kg for the same period. There is information that a muskrat family needs about 1 ton of vegetable food for one year [5]. Taking into account the fact that the calculations used different data on the size of the family, the indicators of the total food are the same. Our data confirm the results of other researchers [10] – during a lack of plant food muskrats eat small animals.

Conclusion

Summing up the research, we can conclude that the muskrat is a very adapted animal, which consumes most plant species growing within the water body and near it. Differences in feeding in separate lakes within the territory determined by the dominance of some plant species and it is typical for feeding of most other animals. A large species diversity of plants and their considerable mass provide all the needs of animal in the warm period of the year. But in winter, when rhizomes of the cane become predominant in the food and resources in the lakes are limited, some difficulties with feeding are possible and in years with high density of animals, it can lead to their death.

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