ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Nutrition Of The Altai Marals (Cervus Elaphus) Acclimatized To Trans-Ili Alatau (Northern Tien Shan).

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ABSTRACT

For the last decades the antler maral breeding in the Republic of Kazakhstan was developed intensively and now it is represented the independent branch of animal husbandry. Maral breeding is caused, first of all, by their physiological adaptation to nutrition of the certain species of the plants, growing in those mountain hunting grounds, which are complicated for farm animals by some specific and ecological conditions. Work was carried out in maral breeding farm, which is located in the Kaskelenskiy donga of Trans-Ili Alatau (Northern Tien Shan, Karasayskiy region, Almaty region of the Republic of Kazakhstan). On a basis of the research there are described the comparative analytical review of nutrition of marals. There is defined the specific structure of vegetation in habitats of marals and alimental behavior of the Altai marals in Trans-Ili Alatau. Also there are described the pasturable nutrition and feeding of marals at the park keeping; maral eating degree of these or those vegetable groups and separate species of plants; seasonal nutrition of marals depending on seasons of year. According to food supply of marals in maral breeding farm it is determined that the vegetative period in Trans-Ili Alatau is longer than in Altai on 30 days. It gives the chance to deer to take natural forages for a long time. The great importance is given to processes of transformation of a vegetation cover as a result of human activities. There is defined the pasture load, promoting to emergence of steady species of plants, low value as fodder. It is shown a decline in livestock production depending on a vegetable cover, as results there is need to transfer of a pasture. The special attention is paid to optimum norms of feeding of the Altai marals taking into account their biological features and climatic conditions of Trans-Ili Alatau. Important value is given to quality of the forages, taken of the Altai marals in Trans-Ili Alatau. In the studied farm the number of deer is grown every year, as a result degradation of natural places of their feeding is inevitable. In this regard it is necessary to take measures for the organization of a rotational grazing and/or to provide to deer full feeding.

Keywords: deer, maral, red deer, Altai marals, acclimatization of marals, maral nutrition, Trans-Ili Alatau, feeding of marals, pasturable nutrition of marals, feeding norms of marals.

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ISSN: 0975-8585

INTRODUCTION

Many researchers are paid great attention to the researches of population of animals and nutrition. T.B. Sablina (1970), G.G. Sobansky (1975), B.D. Abaturov (1975), R.D. Magomedov (1982), M.V. Holodova (1989) consider that fodder resources, their abundance and quantity are fundamental factor of fertility and mortality [1-5]. Yu.A. Smirnov (1968), estimating of the reindeer breeding condition in South Ussuriland at the beginning of the XX century, noted that decrease in fodder potential of park pastures is involved an abatement of deer and decrease in their fertility [6]. I.D. Dobrovolsky (1925) and G.A. Menard (1930) pointed to sharp decrease in fertility and degradation of these animals [7-8].

It is established by P.I. Cheretayev (1959) that feeding of the maral doe with compound feed in the last third of fetation and, that is important, in the period of a lactation, at full provision with hay and a pasturable forage was given 100% maral doe fetation at safe calving [9]. Thus a tentative dam, in comparison with control, had bigger live weight (on 16,8 kg) and the bigger weight of kindle, development of which in the next months was much better [10]. One of the reasons of juvenility of calves, except their late bearing, is the underfeeding of the dams, both in summer, and in winter the periods. In summertime the underfeeding, as a rule, is caused by insufficient provision of the maral does by pastures and the worst quality of their herbage. The lacking amount of nutrients on pastures could be supplied with feeding by their compound feed and green mass. However feeding of a uterine livestock population in a number of farms is not used, and it is observed at the maral farms of Trans-Ili Alatau. As a result of it at the lactating does, there are decreased fatness and a milk ejection and it has an adverse effect on growth and development of a sucking kindle. Besides low fatness the maral does during the summer period is detained timely preparation for rutting. And as a result, their sexual cyclicism is broken, and terms of rutting is prolonged, and it is led to barrenness at maral does, giving a late maral covering and late calving [2, 3, 11, 12, 13, 14,15, 16]. The similar facts are characteristic not only for marals, but they are noted and at other animal species. Research of relations between corpora lutea and slaughter of females of elks in Sweden is shown that with increase in body weight the fertility of elk cows expressed in number of corpora lutea on a female is increased to a certain limit. In lower weight groups there is prevailed singles, in higher - twins. The number of corpora lutea in ovaries significantly was depended on age, but nevertheless the strongest relation was appeared with a mass of carcass [17].

In population of the Canadian wapiti the share of the breeding one-year-old females was fluctuated from 0 to 50%, it was depended both on body weight, and on habitat conditions. Any one-year-old female with average body weight less than 152 kg wasn't gravid, and animals from 152 to 163 kg in 10% of cases were in-calf; the share of such animals in herd was made 25% of weight category of 163-169 kg. Physically strong females of the wapiti in age group of 7,5-14 years in 72-100% of cases were in-calf, but at older females fertility considerably was decreased [18].

Similar regularity is noted at the European roe from various parts of its area. Data on fertility of this species is contained in numerous references which are generalized in work of K. Shtubbe and A. Danilkin (1992) [19]. They were determined that within each age group the females with bigger body weight were bred more successfully. It can be and as result of heredity and bigger fatness in the best habitats. Larger females are much more productive, and also they have more chances successfully to breed the posterity.

On supervision of W.Y. Hamilton, K.L. Blaxter (1980), 743 females of a red deer were used at rutting in one of the regions of Scotland in 1971-1975, but only 71% from them had posterity [20]. Among two-year-old animals calving was registered in 41% of the cases, among five-year-old - more than 90%. Females with the body weight exceeding 53 kg participated in rutting, and only those which weight was not less than 85 kg had posterity.

MATERIALS AND METHODS

The experimental part of work was carried out in maral farm which is located in the Kaskelenskiy donga of Trans-Ili Alatau (Northern Tien Shan, Karasayskiy region, Almaty region of the Republic of Kazakhstan). As object of research there were served the marals of different gender and age groups (calves, saiga, saiga females, the first calving does, young maral does, maral stags, maral does), breeding in this farm. As basis for experiments there were the scientific and economic experiments, which were made according to the standard methodical requirements [21]. For studying of nutrition during the winter period it was applied a tracking of traces in places of feeding of deer with determination of specific structure of plants, in some cases there was determined the norms

of the consumed feeding. The abstract of species of the vascular plants, eaten by a maral in Northern Tien Shan and in Altai, was made by our supervision and data of other researchers [22, 23]. The nomenclature and systematic belonging of the most part of types is given according to "Flora of Kazakhstan" (1956-1966) with use of more modern understanding of volumes of taxons, which are general for Kazakhstan and Siberia, and which were specified according to "The abstract of flora of Asian Russia" (2012) and to "The abstract of flora of the Irkutsk region" (2008) [24, 25,26]. Families in the abstract are structured by A. Engler system (1887), calving and species – by alphabetically their Latin names [27].

Biological features of marals during various seasons of year (biorhythms), their behavior in herd and in the conditions of individual isolation were studied by method of visual supervision on V.E. Sokolov's method (1978) [28]. The technique of visual supervision is added with zootechnical researches by arrangement of research and production experiences. The main indicators, characterizing their productivity, were live mass of marals, mass of antlers and amount of kindle.

The characteristic of climate and duration of the vegetative period is provided on agroclimatic resources of Almaty and the East Kazakhstan regions (1978, 1975) [29,30].

RESEARCH RESULTS

Trans-Ili Alatau – is the most northern mountain ridge in mountains Tien Shan, in comparison with Altai has also a number of advantages to successful maral breeding. The smaller amount of precipitation during the summer and autumn period in comparison with Altai creates favorable conditions for feedstock of high-quality leaf-bearing mountain hay.

Important condition for industrial breeding of the Altai marals in Trans-Ili Alatau is habitation of the Central Asian form of a maral - Cervus elaphus songarica lives (Severtzov, 1873).

The first 60 marals were brought to the Kaskelenskiy donga from the Katon-Karagay region of East Kazakhstan area in 2001. There were brought 30 maral stags and 30 maral does. The second party was brought in 2002 in number of 40 heads. In this party there were 20 saigas, 20 saiga females.

Since brought of marals to Trans-Ili Alatau its number in farm was considerably increased. So, in 2001-2002 the number of marals was increased by 10 heads, from them 5 females and 5 males, and their general quantity was made 80 heads. In 2002 it was brought to the farm 30 marals and the number of heads was increased to 110. In 2003 the number of marals was increased to 118 heads. In 2004 to the main uterine livestock it was increased 20 females, thereby as result in breeding 50 maral does were participated and the general livestock was grown to 132. In 2005 the share of the maral does, participating in breeding, was increased to 55 heads, and the total number of marals was increased to 149 individuals. From 2006 to 2014 the number the maral does was increased and made respectively 58, 64, 70, 77, 85, 87, 89, 93 heads. From 2006 to 2014 the total number of marals was increased to 248 individuals. Thus, the average annual increase of number of marals in farm was made 48,7%. However, it is necessary to consider that the indicator of increase is calculated as from the individuals brought from Altai, and the posterity, bred in the conditions of a maral farm of Trans-Ili Alatau.

PASTURABLE NUTRITION

It is known that within an area real or red deer eats not less than 300 plant species [31, 32]. According to our data within Trans-Ili Alatau the number of the revealed eaten plants is made about 90 species, thus all noted plants potentially are fodder with different degree of value. For comparison, in the Leningrad region the feeding supply of a red deer is had 170 species [33]. It is known also that in different parts of an area deer eat different quantity of plants. So, in Bialowieza Forest the European deer eat not less than 80 plant species [1]. The Altai marals, re-acclimatized in Bashkir Nature Reserve, eat more than 150 species of plants [34]. In Altai within a year marals eat not less than 210 species of plants from which 170 species are herbaceous plants and 47 species of bushes and trees; and in East Sayan there are established eating by a maral 145 species of plants [22, 35, 36]. Transbaikalia's deer within a year eat 107 species of plants, and in the Far East – not less than 100 species [28, 31]. In Dzungaria and Trans-Ili Alatau within a year the maral eats more than 200 species of plants of which in summertime the basis of nutrition is made by herbaceous plants, and in winter time – wood- twig food and rags, it is characteristic for the species in general [23, 31].

The preferred forages for animals has the seasonal features. In Trans-Ili Alatau marals are started eating the wood- twig food regularly and in a large number in autumn, since October-November. In winter the share of wood- twig food is increased and become to maximum in March. They are prevailed at this time in ration at marals, though herbaceous plants in the form of rags are eaten by deer constantly. More wood- twig food (sproutes, bark) are eaten by marals in snowy winters, especially during bad weather and some days later, until the southern slopes will be free from snow. In April, with snow thawing, the share of wood- twig food is decreased though during bad weather animals eat them more often. In the lower mountain zones since the end of April, and in the top places - from first half of May marals are fed with greens, which become later gradually as the main summer forage [23].

In Gorny Altai since the end of February and in March with the appearance of the first thaw the marals eat the rags in escalating quantity. In April this forage is become the basic [35]. In the conditions of Trans-Ili Alatau, where snow is started to descend for about two weeks earlier, marals pass to nutrition with last year's herbs since February.

At the end of March there are first green plants (greens is especially well and early grown on "nesting hollows" on which avalanches is descended): a lungwort (Pulmonaria officinalis), an adder's-spear (Erythrunium sibMricum), a primrose (Primula pallasii), a prairie anemone (Pulsatílla pátens), different species of onion families (Alliaceae). During the first days marals, continuing to eat rags, don't pay attention to greens, only occasionally, passing by, eat one-two green plants. However all gradually they eat greens more willingly, and in April it is become the dominating type of forage. Many green plants during typesetting fat period are eaten. Often "nesting hollows" are visited by marals and in May as greens usually higher on them, more luxuriant and are more juicy. Maral excrements during this period are taken a form of liquid green mass - instead of hard nuts, which are usual in winter. It is noted an eating of leaves of a leather bergenia (Bergénia crassifólia) during the same time. In other time, even at winter, the maral doesn't eat leaves of a leather bergenia (Bergénia crassifólia), only in spring sometimes it eats his inflorescences. Possibly, eating of a leather bergenia (Bergénia crassifólia) promotes an elimination of indigestion, connected with transition to a gentle green grass. Perhaps with the same purpose at spring the marals is strenuously "regaled on the salty" then their excrements again are got a form of the hard nuts consisting from only clay. Final transition to nutrition by green grassy plants is started in the first half of May. In the same time the marals willingly eat a sorrel (Rúmex acetósa) in which in a large number is contained tannins. As well as in Gorny Altai, eating of a sorrel (Rúmex acetósa) by a maral is promoted elimination of indigestion, connected with transition to a gentle green grass. In May in the Kaskelenskiy donga of Trans-Ili Alatau marals are more often fed on the sun slopes, on which there is various grassy vegetation. Males are usually fed above the upper bound of the forest at crests. In summer they are grazed in upper courses of streams of subalpine and Alpine belts, keeping at fir groves, near white-winged grosbeak thickets or at edge of glaciers and snowfield. In summertime the places of feeding of females are timed to glades between forest islands and to forest border.

In September-October, during rutting, females and males prefer to be fed on shadow sites of slopes, where it is remained longer the snow, which is fallen from time to time, and the hoarfrost remaining after night frosts. The vegetation there higher, more densely and longer is remained green. On such places deer are fed and after considerable snowfalls. To the late autumn the marals avoid to be fed on the southern slopes where the vegetation is strongly overdried. They come to these slopes after snowfalls when the fallen snow was thawed several times, and in other places (northern, east, western slopes) when snow will be finally lain down. In snow winters practically all the time marals are fed only on the southern slopes. When the southern slopes are become covered by snow, marals are fed on northern slopes in the forest, but sometimes they go down to valleys of streams, where eat the bush sprouts.

The number of the vascular plants, eaten by a maral for the analyzed territories, is made 186 species (taking into account not identified to species – 205), belonging to 126 genuses, 41 families, 5 classes, 4 sections.

Trees and bushes are dominants, subdominant on number of individuals the types and edificators (creating microclimatic conditions) of plant communities, forming "an ecological structure" of the Kaskelenskiy donga of Trans-Ili Alatau. Habitats are belonged to the plant communities with high participation of species of bushes of willow genuses. Dense vegetation of bushes, surrounding the territory of maral farm of the background plant communities is made from 20-30% to 90-100%. This landscape feature is an important ecological condition of development of reindeer breeding in the territory.

Among woody plants in nutrition of marals in a cold season, the representatives of three families are important: willow (Salicaceae) – 9 species, birch (Betulaceae) – 4 species and Rosaceae (Rosaceae) – 12 species.

Herbaceous plant in the fodder relation can be divided into four economic groups: cereals, sedge, legumes and miscellaneous herbs.

In the group “cereals” there are included the representatives of family Gramineae (Poaceae). All family is valuable in the fodder relation and its specific variety is poorly observed in our work on the reason of difficulties in systematic definition of plants. The similar situation is developed and with sedge (representatives of Cyperaceae family). A small specific variety of these two families is explained also by ecotopic features: cereals and sedge are more characteristic for inundated meadows and meadow steppes which are poorly presented in habitats of the studied group of deer.

Legumes (representatives of Fabaceae family) are allocated separately in economic and valuable group of fodder plants, as they are exclusively rich with proteinaceous nutrients. Legumes are made very big share of a biodiversity of the mountain meadows and steppes, extended on Tien Shan and Altai. A.K. Fedosenko (1980) specifies that at maral rations there are 15 species, from which 6 are eaten by marals on our supervision. Importance from legumes has species of genus of pea everlasting (Lathyrus) [23].

From miscellaneous herbs the big share of a specific variety of the plants, eaten by deer, is given to the Compositae family (Asteraceae) – 37 species from 23 genuses. It is the most numerous family within all Holarctic. The second place on number species has the Umbrelliferous family (Apiaceae) – 23 species from 17 genuses, the representatives of which are also very characteristic for areas of altitudinal zonality. Also a big important has families in addition of economic group of fodder plants as "miscellaneous herbs": buckwheat (Polygonaceae) – 10 species from 5 genuses, Rosaceae (Rosaceae) – 6 species from 3 genuses, Labiatae (Lamiaceae) – 6 species from 4 genuses. There is surprised a big participation in nutrition of marals of representatives of Buttercup family (Ranunculaceae) – 18 species from 9 genuses, as all of them are poisonous plants, however, not having great fodder value [23]. There are noted only 8 species the Buttercup family, as eaten by marals in Trans-Ili Alatau.

In the territory of Trans-Ili Alatau wood plants are important for nutrition of maral, making branch forage, and also the species which are constituent as economic group to miscellaneous herbs. At the organization of the maral farms, an existence of natural forages and their variety is played an important role in full development of deer. However, only in the first years limited on the area the territories of parks are provided more or less with enough forage for marals. So, the moderate pasture and haymowing are favorably affected for the floristic structure and fertility of grassy plant communities. The soil strongly is condensed, and it has an eutrophication, quantity of species of legumes family and cereals are increased, there is amplified by miscellaneous herbs. Increase of participation of legumes family (Fabaceae) and cereals (Poaceae), against practical disappearance of sedge family (Cyperaceae), is allowed to identify as the changes, which resulted from haymowing and grazing animals [38,39].

Further at increase in pasturable loading (trampling down), first of all, there are suffered young specimens of wood and semi-wood species of plants, the soil is condensed, and it is promoted to development of grassy vegetation, draining of the territory, the best seasonal defrosting, initial plant communities are destroyed.

Subsequently on an edge of open sites, on border with the forest, there are typically margin types, such as for example, a willow-herb (Epilóbium angustifolium) and ginger plant (Tanacetum vulgare), etc. It is increased participation of the goosefoot family (Chenopodiaceae), recognized by botanists as the family, diagnosing processes of transformation of a vegetable cover as a result of any economic activity of the person [40,41]. Thus the share of representatives of a genus a wormwood (Artemisia) becomes significantly more noticeable, that testifies to the same changes [42,43].

Gradually anthropogenic and zoogenic loadings will be promoted to an emergence of steady species of plants, invaluable in the fodder relation, and efficiency of a vegetable cover will be fallen, as results there is appeared the necessity to transfer of a pasture. Taking into account that in the studied farm the number of deer is grown every year, as a result degradation of natural places of their feeding is inevitable. In this regard it is necessary to take measures for the organization of a rotational grazing and/or to provide to deer full feeding.

ISSN: 0975-8585

FEEDING OF MARALS

Marals from May to October are on pastures. Depending on terms of snow cover fall, the marals are transferred to winter places. In comparison with park marals, in a natural environment the stags are more well-fad during the summer period, in autumn by the beginning of rutting reaching of the highest fatness. During rutting stags eat very little and strongly reduce in weight. Then from November to January there is come the period of relative rest, when the stags are gained weight. In February-March it is started the growth of antlers, and then shedding of hair. At this time marals reduce live weight and start again increasing it with the appearance of a grass in spring. In winter marals are usually fed on "blown-off snow" and in other places, where snow cover is less. There is lack such opportunity in limited territories of parks, therefore within 5-6 winter months all herd of park marals is kept generally on the prepared forages.

It is considered all above-mentioned need in the offered rations, as for improvement of productive qualities of females, and males [44]. Most of authors at the organization of feeding of marals are marked out three main periods.

- August - the first half of September - preparation for rutting;
- the second half of October-December - autumn fattening after rutting;
- March – June – growth of antlers.

After coming to winter places the stags have to eat abundant forages. At this time they quickly increase live weight and at normal feeding they have a good state at wintering. At this time taking into account sexual and age structure of herd, at farm the average need on the head is made 17 centners of hay and 2 centners of oats in 5-6 months [45,46,47,48]. In the studied farm the forages were given according to ration, based on known experience of feeding of the Altai marals [49].

Going out of the stags on pastures is coincided with the final period of growth of antlers. The young pasturable grass has positive impact on increase of stags fatness and growth of antlers. However, in March-April it isn't enough of pasturable forages for such large number of the heads keeping at maral farm of Trans-Ili Alatau, therefore feeding with forages is proceeded until the end of May, and, feeding with compound feed and silage is increased approximately by 1,5-2 kg on the head per day (table 1). At such feeding the live weight of the stags is not lost that, respectively, allows developing fully and for the antlers (table 1).

In June after cutting of the antlers on pastures, if they are used in right way, for the stags it is not necessary any feeding. However nutrition in the form of compound feed is offered until the end of June during antler cutting at adults of the stags in the Altai farms. Since August in many farms of Altai feeding of deer is begun compound feed again. Practice of state farms was confirmed that feeding of 1-2 kg of oats a day on one individual during August and September is sufficient in availability of pastures of average quality [45]. In maral farm of Trans-Ili Alatau such feeding is not carried out. However, in our opinion it is especially necessary as the capacity of pasturable grounds is lower than the recommended standards and it is made averages 1,25ga for all individuals. Such pastures by the end of summer are strongly trampled down and eaten by marals [50].

As preparation of hay in mountain conditions is interfaced to great difficulties in view of plentiful precipitation, difficulties of mechanization of process, along with hay one of the main roles in feeding of marals is played silage, which we surely included in maral rations [10].

In maral farm of Trans-Ili Alatau feeding with silage was carried out as follows: to stags from 7 to 15 kg (seasonally), to first calving does and females from 4 to 7 kg. The silage is fed regularly during all stall period.

Since the beginning of March it is reduced feeding by hay to males and silage and compound feed is increased. Rations during these months – are made 4-6 kg of hay, 5-15 kg of silage with the general nutritiousness about 4,5 kg on one head. In April-May nutritiousness of rations was increased to 6,0 kg on one head, increasing a daily ration of silage (tab. 1).

If at the stags there can be allocated three periods when they need the strengthened feeding, but in feeding the maral does of such periods are two: 1) in spring, in the second half of pregnancy when they need the strengthened nutrition; 2) in autumn during preparation for rutting [51].

ISSN: 0975-8585

Table 1 – Maral feeding in "Alatay Maraly" LTD, taking into account their biology and phonological aspects

Month	Vegetative period	Snow cover (cm)	Average decade air temperature, t^0	Average decade amount of precipitation, (мм)	Rutting	Cyophoria	Calving	Development of antlers of young stags	Development of antlers of ephebic stags	Cutting of antlers	Feeding of marals - stags (kg / 1 individual *)			Feeding of does and maral young growth (kg / 1 individual *)		
											Hay	Silage	Compound feed	Hay	Silage	Compound feed
September			18	17												
			16	17												
			13	16												
October			11	15												
			8	15												
			5	15												
November			2	15							7	11	0,7	6,5	4	0,5
		13	1	15							7	11	0,7	6,5	4	0,5
		11	-1	14							7	11	0,7	6,5	4	0,5
December		13	-2	11							7	11	0,7	6,5	4	0,5
		22	-3	9							7	11	0,7	6,5	4	0,5
		25	-4	8							7	11	0,7	6,5	4	0,5
January		27	-5	8							7	11	0,5	6,5	4	0,5
		30	-5	7							7	11	0,5	6,5	4	0,5
		31	-5	7							7	11	0,5	6,5	4	0,5
February		35	-5	7							7	11	0,5	5,5	6	1
		36	-4	8							7	11	0,5	5,5	6	1
		30	-3	9							7	11	0,5	5,5	6	1
March		31	-1	14							4.5	13	1,8	5,5	6	1
		23	0	20							4,5	13	1,8	5,5	6	1
		33	2	26							4,5	13	1,8	5,5	6	1
April		14	1	30							4,5	13	1,8	4,5	5,5	1,5
			3	35							4,5	13	1,8	4,5	5,5	1,5
			5	39							4,5	13	1,8	4,5	5,5	1,5
May			7	57							2,5	13	1,8	4,5	5,5	1,5
			8	59							2,5	13	1,8	4,5	5,5	1,5
			10	58							2,5	13	1,8	4,5	5,5	1,5
June			11	48												
			12	40												
			13	32												
July			14	30												
			14	28												
			14	26												
August			15	22												
			14	20												
			13	18												

* Values in table 2 are average; the interval for hay and silage is made ± 1,5kg, for compound feed 0,5kg.

ISSN: 0975-8585

Table 2 – Recommendations for maral feeding in Altai, taking into account their biology and phonological aspects (according to Lunitsyn, 2002).

Month	Vegetative period	Snow cover (cm)	Average decade air temperature, t^0	Average decade amount of precipitation, (мм)	Rutting	Cyophoria	Calving	Development of antlers of young stags	Development of antlers of ephebic stags	Cutting of antlers	Feeding of marals - stags (kg / 1 individual *)			Feeding of does and maral young growth (kg / 1 individual *)		
											Hay	Silage	Compound feed	Hay	Silage	Compound feed
September			10	13									1		7	0,5
			8	12									1		7	0,5
			6	12									1		7	0,5
October			3	12									1		7	0,5
			1	12									1		7	0,5
			-2	12									1		7	0,5
November		8	-5	10							7	11	0,7	6,5	4	0,5
		14	-9	8							7	11	0,7	6,5	4	0,5
		15	-12	7							7	11	0,7	6,5	4	0,5
December		15	-14	6							7	11	0,7	6,5	4	0,5
		19	-16	6							7	11	0,7	6,5	4	0,5
		19	-17	6							7	11	0,7	6,5	4	0,5
January		19	-18	5							7	11	0,5	6,5	4	0,5
		22	-18	5							7	11	0,5	6,5	4	0,5
		22	-18	4							7	11	0,5	6,5	4	0,5
February		22	-17	4							7	11	0,5	5,5	6	1
		22	-16	3							7	11	0,5	5,5	6	1
		22	-15	4							7	11	0,5	5,5	6	1
March		23	-13	4							4,5	13	1,8	5,5	6	1
		22	-10	4							4,5	13	1,8	5,5	6	1
		18	-7	4							4,5	13	1,8	5,5	6	1
April			-5	5							4,5	13	1,8	4,5	5,5	1,5
			-2	8							4,5	13	1,8	4,5	5,5	1,5
			2	10							4,5	13	1,8	4,5	5,5	1,5
May			5	20							2,5	13	1,8	4,5	5,5	1,5
			7	20							2,5	13	1,8	4,5	5,5	1,5
			9	21							2,5	13	1,8	4,5	5,5	1,5
June			12	20									1			
			13	21									1			
			14	21									1			
July			15	22												
			16	22												
			15	22												
August			15	21									1			
			14	20									1			
			12	18									1			

* Values in table 2 are average; the interval for hay and silage is made ± 1,5kg, for compound feed 0,5kg.

The main condition of keeping of productive herd is readiness of females for coupling. Therefore females must have good fatness during rutting, calving and in the period of a lactation. In the first half of pregnancy (from September to January) maral does are recommended to feed about 6-7 kg of good hay in day and 3-5 kg of silage, approximately 1 kilogram on compound feed that corresponds about 3-3,2 kg on one head.

In maral farm of Trans-Ili Alatau it is started to feed up only with the first snow fall that for 1,5 - 2 months later of the recommended terms for the maral farms of Gorny Altai. It is explained by long vegetative period in the Kaskelenskiy donga of Trans-Ili Alatau and late snow covering than in Altai (tab. 1-2).

Maral does, young maral does and first calving does feed up in park since November. At this time they are given at the rate on the head per day of hay on 5-7 kg, silage 4 and compound feeds - 0,5 kg.

In the second half of pregnancy (since the beginning of February) feeding by forages has to be increased with considering of the fetal growth and accumulation of some reserves in dam organism. Proceeding from it, in the second half of pregnancy it is necessary to give 3,6-3,8 kg on one head that it is made approximately on 5-6 kg of hay, 5-6 kg of silage and on 1kg compound feeds. Since the beginning of April feeding with silage and compound feed are decreased a little, but feeding of the combined forages is increased. Feeding by the compound feed in the period of going out of deer to a pasture is especially important, as at the beginning of the vegetative period in nutrition a lack of green herbs is very appreciable, therefore maral does are recommended to add to a ration the compound feed in addition not less than one kg on one head. [10]. Proceeding from this recommendation in given maral farm it is increased feeding of compound feed to 1,5 kg on one head. The feeding of forages to females is stopped in farm with beginning of impetuous vegetation of grassy plants.

It should be noted that besides the specified types of forages in maral farm there is an obligatory additive in deer ration by twig forages, deficiency of which is noticeable during the stall period, when all available branches of trees and bushes are eaten at immediate neighborhood of the additional forage pastures.

CONCLUSION

Thus, at the park deer keeping it is necessary providing good nutrition which is formed of two components – the forage, which is got by deer in park independently – and feeding, provided by farm during the hard deer periods. Taking into account that in the studied farm the number of deer is grown every year, as a result degradation of natural places of their feeding is inevitable. In this regard it is necessary to take measures for the organization of a rotational grazing and/or to provide to deer full feeding. We consider that typical specific for marals is selective approach to hay: if it is prepared not in mountain conditions and, according to our assumptions, doesn't consist of the majority of the plants, which were considered in this work, marals eat them with reluctance and it is affected on their fatness. Availability of qualitative hay is especially important during beginning of hard frosts when the silage isn't given to deer.

Also forming balance of energy and nutrients at marals at feeding, it is necessary to consider not only the quantity, but also quality of forage, thus great value should be given to a physiological condition of animals.

Estimating a food supply of marals in maral breeding farm there can be stated a fact that the vegetative period in Trans-Ili Alatau is longer than in Altai on 30 days. It gives the chance to deer to take natural forages for a long time. Feeding of deer is conducted taking into account the recommendations, developed for the maral farms of Altai [51]. However, there aren't kept the feeding norms during the autumn period and, perhaps, it is negatively effected on females during rutting and the first half of pregnancy.

In researches there weren't studied the plants which can be indicators of changes of maral nutrition. Such research has to be conducted obligatory in the future. Also in researches there weren't studied a chemical composition of maral nutrition, which is determined an assimilability of nutrients of the eaten plants and forages. It is not studied completely fodder features and quality of additional forages, which will be studied in the future.

REFERENCES

[1] Sablina T.B. Evolution of alimentary system of deer. - M.: Science, 1970. – P. 247.

[2] Sobanskiy G.G. Nutrition of a wild maral in Altai//Central research laboratory works of antler reindeer breeding. - Barnaul, 1975. – P. 29-39.
[3] Abaturov B.D. About mechanisms of natural regulation of the relationship of herbivorous mammals and vegetation//Zoological journal, 1975. - T. 54. – No. 5. – P. 741-751.
[4] Abaturov B.D., Magomedov R.D. Nutritional value and dynamics of fodder resources as factor of a population condition of herbivorous mammals//Zoological journal, 1982. – T. 67. – No. 2. – P. 223-233.
[5] Holodova M.V. Feeding and forage assimilation by the wild ruminants of the moderate zones//Diss. … Cand.Biol.Sci. - M, 1989. – p. 211.
[6] Smirnov Yu.A. Acclimatization of sika deer in Altai//Author's abstract. Diss. Cand.Biol.Sci. - M, 1968. – p. 23.
[7] Dobrovolskiy I.D. Breeding of sika deer in Primorskiy area//Hunting and the hunter, 1925. - No. 7. – P. 18-24.
[8] Menard G.A. Antler farm. - M.-L., 1930. - p.166.
[9] Cheretayev P.I. Influence of the maral doe strengthened feeding on the breed //Central research laboratory works of antler reindeer breeding. - Gorno-Altaisk, 1959. – P. 55-59.
[10] Galkin B.C. System of conducting antler reindeer breeding// Central research laboratory works of antler reindeer breeding. - Gorno-Altaisk, 1971. - Publ. 3. – P. 18-33.
[11] Antipov E.I. Winter nutrition of a maral and the roe in West Sayan //Research of components of forest Siberia biogeocenosis. - Krasnoyarsk, 1976. – P. 92-112.
[12] Dinesman L.G. Influence of wild mammals on formation of stand of trees. - M.: Publishing house of Academy of Sciences of the USSR, 1961. – P. 325-336.
[13] O.S. Anderson, Hogan A.O. Adecguacy of sintetic diets For gronth and reproduction of Swine – 1950. – Zin 9. – P.163.
[14] Potter J.H., L.D.Matterson Metabolizable energie of feed, Poultry Sci., 39, 1960. – P.76.
[15] Meyer J.H., Nelson A.O. Efficienty of Feed Utilisation by Varios Similar Rations//Jouri. Nutrition, 1963. – V. 80. – No. 4. – P.45-48.
[16] Virtanen A.J. Produktion der Kuhmich ohne Proteins mit Harnstoff und Ammoniumsalzen als Stickstoffguelle und gereinigten Kohlenhydraten als Energieguelle. Bioch. Zeitschrift. Bd. No. 338. – 1963. – P.7-12.
[17] Markgren G.Reproduction of moose in Sweden//Viltrevi. – 1969. V. 28/2. – P.3-7.
[18] Taber R.D, Raedeke K., McCaughran D.U. Population characteristics//Elk of North America: Ecology and management. – 1982. – P. 279-300.
[19] Shtubbe K., Danilkin A. Breeding//European and Siberian roe. – M.: Science, 1992. – P. 140-153.
[20] Hamilton W.Y. Blaxter K.L. Reproduction in farmed red deer//Y. Agr. Sci. – 1980. – V. 95/2. – P. 261-273.
[21] Ovsyannikov A.I. Bases of experimental work in animal husbandry. - M.: Kolos, 1976. – P. 256.
[22] Dmitriyev V.V. Ungulated animals of Altai Nature Reserve and adjacent places (Eastern Altai and Western Sayan)//Altai Nature Reserve Works. - Gorno-Altaisk, 1938. - Publ. 1. – P. 61-69.
[23] Fedosenko A.K. Maral. - Alma-Ata, 1980. - P. 200.
[24] Kazakhstan's flora. – T.T. 1-9. – Alma-Ata, 1956-1966.
[25] Malyshev L.I. and others. Abstract of flora of Asian Russia: vascular plants / under the editorship of K.S. Baykov; Russian Academy of Sciences, Sib. branch, Central Siberian botanic garden. – Novosibirsk: Publishing house of the Siberian Branch of the Russian Academy of Science, 2012. – P. 640.
[26] V.V. Chepinoga and others. The abstract of flora of the Irkutsk region (vascular plants) / under the editorship of L.I. Malyshev. – Irkutsk: Publishing house Irkutsk State University, 2008. – P. 327.
[27] Engler A., Prantl K. Die natürlichen Pflanzenfamilien nebst ihren Gattungen und wichtigeren Arten insbesondere den Nutzpflanzen. – Leipzig: Verlag von Wilhelm Engelmann, 1887. – P.130.
[28] Sokolov V.E., Kuznetsov G.V. Daily rhythms of activity of mammals. - M, 1978. – P. 160.
[29] Agroclimatic resources of Almaty area of Kazakh Soviet Socialist Republic: Lenigrad: Gidrometeoizdat, 1978. – P. 199.
[30] Agroclimatic resources of the East Kazakhstan region of Kazakh Soviet Socialist Republic: Lenigrad: Gidrometeoizdat, 1975. – P. 159.
[31] Geptner V.G., Nasimovich A.A., Bannikov A.G. Ungulated faunae of the USSR. Ecology, morphology, use and protection. - M.: The higher school, 1961. - T.1. – P. 67-70.
[32] Owen-Smith N. 1982. Factors influencing the consumption of plant products by large herbivores//Ecology of Tropical Savannas. Berlin. P. 359–404.
[33] Goryshina T.K. Plant ecology: Manual – M.: Higher School, 1979. – P.368.
[34] Kaznevsky P.F. Maral colonization in South Ural//Zoological journal. - 1956. - T. 35. - Publ. 10. – P. 51-56.

[35] Sobansky G.G. Ungulated of Gorny Altai. - Novosibirsk, 1992, P 257.
[36] Zyryanov A.N. Wild ungulated animals of the reserve “Stolby” and adjacent areas//Territory of the state reserve “Stolby”. - Krasnoyarsk, 1975. - Publ. 10. – P. 83-88.
[37] Danilkin A.A. Oleniyi (Cervidae). – M.: Geos., 1999. – P. 552.
[38] Borinevich V.A., Konyushkov I.V. and others. Natural haymakings and pastures. – M-L., 1963. – P. 548.
[39] Korobeynikova V.P. Influence of anthropogenic factors on forest meadows of the Ilmenskiy reserve// Chelyabinsk Scientific Center News. – 2002. – publ. 2 (15). – P. 79-84.
[40] Fukarek F., Müller G., Schuster R. Earth flora. – M.: World, 1982. – T. 1 – P. 136.
[41] Vin'kovskaya O.P. Phytoindication of hunters and reindeer herdsmen from the hinterlands of Baikal-Patomsky Upland activities (Irkutsk Region, Russia)//Materials of the International scientific practical conference. Irkutsk: Publishing house of IrSAA (Irkutsk State Agrarian Academy), 2010. P. 268-271.
[42] Hoeg O.A. Planter Og Tradisjon. Floran I Levende Tale Og Tradisijon I Norge 1925-73. Universitetsforlaget, Oslo, Norway, 1975.
[43] Aronsson K.A. Pollen evidence of Saami settlement and reindeer herding in the boreal forest of northernmost Sweden – an example of modern pollen rain studies as an aid in the interpretation of marginal human interference from fossil pollen data/Review of Palaebotany and Palynology, 82 (1994) P.37-45.
[44] Norms and rations of farm animal feedings. Handbook. The 3rd edition edited and added. / Under the editorship of A.P. Kalashnikov, V.I. Fisinin, V.V. Shcheglov, N.I. Kleymenov. - Moscow. 2003. – P. 456.
[45] Druri I.V., Mityushev P.V. Reindeer breeding. - M.-L., 1963. – P. 224.
[46] Galkin V.C. A practical advice on antler reindeer breeding in Gorny Altai. - Gorny Altaisk, 1967. – P. 44.
[47] Pyatkov of L.P. Maral breeding. - Alma-Ata, 1971. – P. 130.
[48] Yeger V.N. Scientific bases of energy normalization in maral rations// Author's abstract. Diss. of DPhil of agricultural sciences. - Novosibirsk, 1994. – P. 52.
[49] Lunitsyn V.G., Sankevich M.N. and others. System of breeding work in antler reindeer breeding. Recommendations. RRIFPD (Russian research institute of fire-prevention defense). - Barnaul, 2000. – P. 30.
[50] Lunitsyn V.G. Antler reindeer breeding of Russia / Russian Academy of Agrarian Sciences. Siberian branch of RRIFPD. Barnaul, 2004, P. 582.
[51] Lunitsyn V.G. Antler reindeer breeding of Altai// Central research laboratory works of antler reindeer breeding. - Barnaul, 2002. - T.1. – P. 3-8.