THE NUTRIENTS INTAKE FROM FARM FODDERS USED FOR SUPPLEMENTAL FEEDING OF EUROPEAN BISON

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ABSTRACT:

The source materials (the animals' state and the quantity of applied farm fodders) come from the forest district Kobiór and enclose the period from 2002 to 2007. These information were the basis for an evaluation of the nutritional value of fodders used in supplemental feeding of European bison in the "Żubrowisko" Reserve. In the sequence of the entire year meadow hay and mixture of crops (maize, wheat, oat, barley, wheaten brans) were the ground of applied farm fodders. In the period from October to April European bison had access to root crops (beets and carrots) which were an additional source of nutrients. Dietary evaluation took into account the following nutrients: dry meter intake [DMI], netto energy lactation [NEL], intestinal digestible protein [PDI], organic meter [OM], crude protein [CP], crude fiber [CS], neutral detergent fiber [NDF], fill units for cattle [CFU]. The largest consumption of fodder components was affirmed in January, and the smallest in July. Late in spring and in summer months the level of nutrients intake (from farm fodders) by European bison was similar to nutritional needs of ruminant suggested in norms INRA and DLG. In remaining months especially in winter the level of nutrients intake, except for fill units for cattle, was high. Additional the coefficients of correlation were enumerated between components of fodders and the temperature of the environment. A close relationship exists between the quantity of nutrients eaten by European bison, and the time of year. Minimum value of the coefficient of correlation (- 0.35) was noted for neutral detergent fiber [NDF], and highest (- 0.87) for cattle fill units [CFU]. Together with growth of the temperature of surroundings the quantity of taken alimentary components gets smaller.

Key words: European bison, supplemental feeding, nutritional value, "Żubrowisko" Reserve.

INTRODUCTION

In Poland Bison bonasus is protected by the low (Law on protection of nature and Regulations of the Environment Secretary determining the list of protected native wild appearing animals species). Thanks to its legal position the European bison is being held in so-called farm centers witch purposes are to support the kind and to increase the population of Bison bonasus. In conditions of the maintenance animals live in allocated areas of the forest. Excess quantities of eaten local plants can cause irreversible changes in the environment. Natural fodder base in the Natural Reserve „ Żubrowisko " isn't covering nutritional needs of Bison bonasus so there is a need to feed animals with country fodders. In available literature there is little information about flushing Bison bonasus.

The purposes of the research were an evaluation of the nutritional value of fodders used in feeding European bison and relations between the amount of nutrients intake and the environment temperature.

MATERIAL AND METHODS

They research was conducted in forest of Pszczyna. European bison were held in two herds - in homestead open for tourists (8) and homestead opened to the reserve (27). Animals were fed in the sequence of the entire year with concentrate - corn (maize, wheat, oat, barley, wheat bran) and hey. Moreover in the period from October to April root crops were given to the animals – beets and carrot.

Source material (the state of animals and amounts of distributed fodders in feeding European bison) was from the forest district Kobiór and concerned the period 2002 – 2007. These information was the basis for carrying out an analyses of contents of nutrients in fodders used in feeding European bison. Applied fodders in feeding European bison were systematized taking into account the kind and their amount in single months. The body weight of European bison was calculated on the basis of structure of the herd and body mass presented in the study Krasińska i Krasiński (2002). The number of animals was determined in each month assuming the value of 500 kg as average mass. Nutritional value of individual farm fodders (table 1) was taken from Norms of feeding ruminants INRA (1993) and studies of Redondo (1997) and Chamberlain (2008).

Table 1. Nutritional value of farm fodders from Norms of feeding ruminants INRA (1993) and studies of Redondo (1997) and Chamberlain (2008).

Nutrition	Farm Fodders							
	Maiz	Wheat	Barley	Oat	Wheaten brans	Beets	Carrots	Meadow hay
Dry meter intake(kg)	0,86	0,86	0,87	0,87	0,87	0,13	0,13	0,85
Netto energy lactation	1,10	1,03	1,00	0,90	0,78	0,15	0,14	0,54
PDIN (g)	70	70	70	70	100	10	10	50
PDIE (g)	100	100	90	70	80	10	10	60
Organic meter (kg)	0,85	0,84	0,85	0,85	0,81	0,12	0,11	0,78
Crude protein (g)	90	110	110	100	150	10	10	70
Crude fiber(g)	20	20	40	120	80	10	10	300
Neutral detergent fiber (g)	110	120	170	290	330	20	10	590
Fill units for cattel	0,00	0,00	0,00	0,00	0,00	0,09	0,09	1,11

The following nutrients were taken into consideration: dry meter intake [DMI], netto energy lactation [NEL], intestinal digestible protein [PDI], organic meter [OM], crude protein [CP], crude fiber [CS], neutral detergent fiber [NDF], fill units for cattle [CFU]. These information allowed an enumeration of average quantity of energy and alimentary components taken by European bison with 500 kg body mass. The graphs were prepared on basis of numeric data calculated from individual months. The Silesia Meteorological Centre in Katowice provided data concerning average temperatures for the region. This information allowed an enumeration of coefficients of correlation between individual nutrients in fodder taken by European bison (mean in years 2002 - 2007), and the temperature of environment. Valuation of the Pearsona coefficient of correlation was accomplished with help of the student t test. Other calculations were performed in the spreadsheet Excel of the package Microsoft Office 2007.

RESULTS AND DISCUSSION

The largest consumption of fodder components was affirmed in January, and the smallest in July.

In July dry metter intake (DMI) amounted 4.23 kg per 500 kg European bison, and in January 13.25 kg, however average dry metter intake in the entire period of examinations was about 8.24 kg (Fig. 1). Examinations on buffalo kept in natural conditions conducted by Miller and Anderson (1996) are pointing, that largest intake of dry metter is being observed in autumn(10.2 kg), and smallest in winter (7.8 kg). Miller and Anderson (1995; 1996) are stateing that by buffalos there are important differences between intake of dry metter in summer-autumn and spring. Needs of dry metter intake for young breeding cattel is 9 – 10 kg (Zarudzki 1999). Average dry metter intake applied in farm fodders used in supplemental feeding of European bison was located in norms for ruminants.

The energy expressed in NEL taken of fodders applied in flushing European bison in July amounted 3.95 MJ/kg, and in January 11.31 MJ/kg (Fig. 2). However average netto energy lactation taken by European bison about the body weight of 500 kg amounted 7.19 MJ/kg which was higher than the needs for young breeding cattel that demand 4.7 MJ/kg (INRA 1993). Olech (2008) is stateing that the average accepted needs for European bison amounts to 5.0 MJ/kg for males, and for females 4.8 MJ/kg. However for mother cows with calves demand amounts to 7.4 MJ/kg.

In July average PDIN intake amounted to 338 g per 500 kg European bison, whereas PDIE to 384 g, and in January 899 g PDIN and 1088 g PDIE. However average intake for PDIN for the entire period of examinations amounted about 597 g, and PDIE 698 g (Fig. 3 and 4). Intestinal digestible protein needs for young breeding cattel amounts to 345 g (INRA 1993). It is possible and so to assume that average PDI intake by European bison was slightly higher than in norms for ruminants. Olech (2008) is stateing that the average accepted needs of intestinal digestible protein for European bison males amounts to 425 g (body weight of the about 500 kg), for females (body weight of the about 450 kg), and for mother cows with calves even to 790 g.

In July organic meter (OM) intake amounted 4.02 kg per 500 kg European bison, and in January 12.42 kg, however average dry metter intake in the entire period of examinations was about 7.73 kg (Fig. 5).

European bison about the body weight of 500 kg in July ate 503 g crude protein (CP), and in January 1382 g, however average intake amounted about 908 g (Fig. 6). Needs of crude protein intake for young breeding catte is 780 g (Zarudzki and in. 1999). And so

average intake of crude protein by European bison was higher than numbers in norms for ruminants. Dymnicka and Olech (2000) in the research on feeding European bison in "Żubrowisko" Reserve showed, that cereal crops were applied in bulks and they contained much of crude protein.

Average intake of crude fiber (CS) from applied farm fodders in feeding European bison about body weight 500 kg in July amounted 0.69 kg, and in January 2.95 kg, however average crude fibre intake in the entire period of examinations was about 1.66 kg (Fig. 7).

In July neutral detergent fiber intake amounted 0.75 kg per 500 kg European bison, and in January 1.20 kg, however average NDF intake in the entire period of examinations was about 1.05 kg (Fig. 8).

Taking fill units for cattle (CFU) by European bison about body weight 500 kg in July was 1.78 kg, and in January 10.28 CFU. Average CFU intake for the entire period of examinations amounted to 5.28 CFU (Fig. 9). Needs of CFU for young breeding cattel is 10.4 kg (INRA 1993). From here average intake of CFU by European bison was also clearly lower. One should however mark that with both the summer and the winter animals are eating the natural food in the pszczyna forest which in these examinations wasn't taken into account. Mean of intaken nutrients and the energy concern only farm fodders, with which European bison were fed in years 2002 - 2007.

Calculated coefficients of correlation in the arrangement temperature (the average temperatures for individual months in the year) – nutrients (DMI, NEL, PDI, OM, CP, CS, NDF, CFU) and presented in table 2.

Table 2. Coefficients of correlation in the arrangement temperature – alimentary component

Alimentary components	**Coefficients of correlation**
Dry meter intake	-0,85*
Netto energy lactation	-0,84*
PDIN	-0,82*
PDIE	-0,83*
Organic meter	-0,85*
Crude protein	-0,83*
Crude fiber	-0,86*
Neutral detergent fiber	-0,35
Fill units for cattel	-0,87*

* $p \leq 0{,}01$

Minimum value of the coefficient of correlation (- 0.35) was noted for neutral detergent fiber. However for fill units for cattel the value of the coefficient of correlation was the highest and amounted (- 0.87). For remaining nutrients coefficients of correlation were located in range from – 0.82 to – 0.86. It shows that together with growth of the temperature of surroundings the quantity of taken alimentary components gets smaller. In winter period on account of low temperatures in the environment European bison are satisfying their living demand for nutrients from supplemental feeding. However in summer the natural nutritional base is the primary source of nutrients for European bison.

Fig. 1. Dry meter intake by E. bison (kg/500 kg body weight)

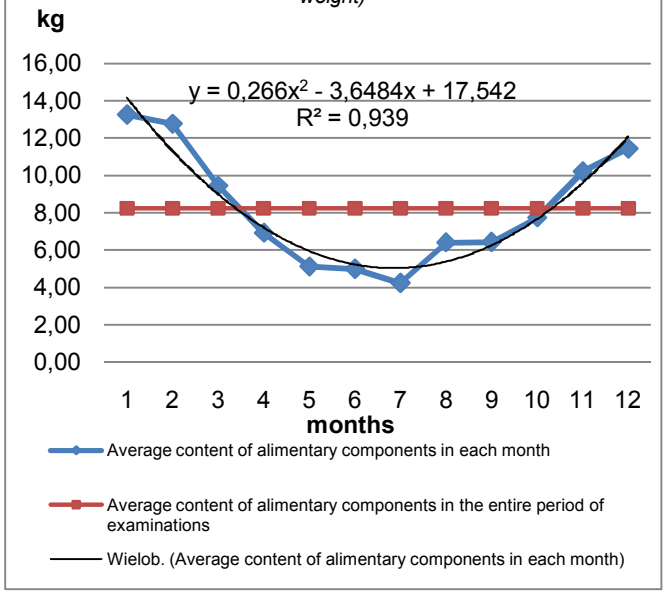


Fig. 2. Netto energy lactation intake by E. bison (MJ/kg/500 kg body weight)

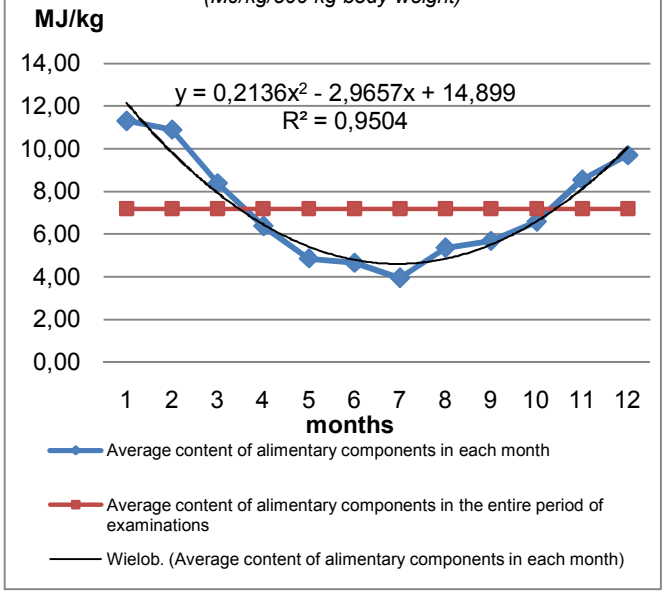


Fig. 3. PDIN intake by E. bison (g/500 kg body weight)

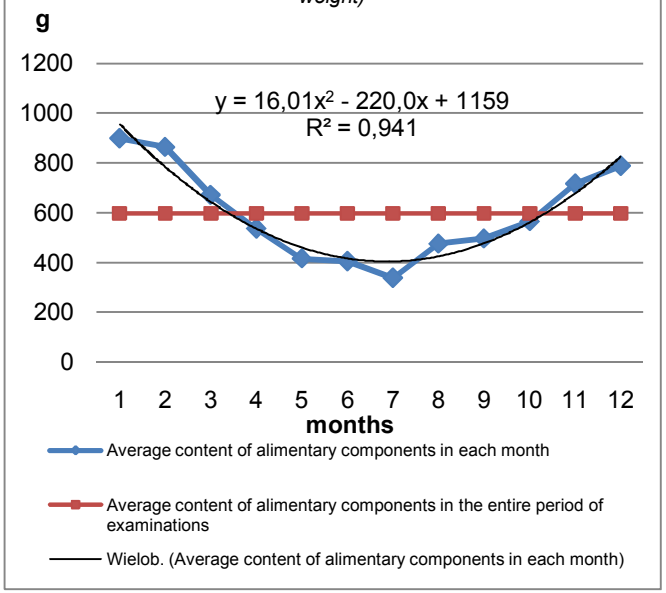


Fig. 4. PDIE intake by E. bison (g/500 kg body weight)

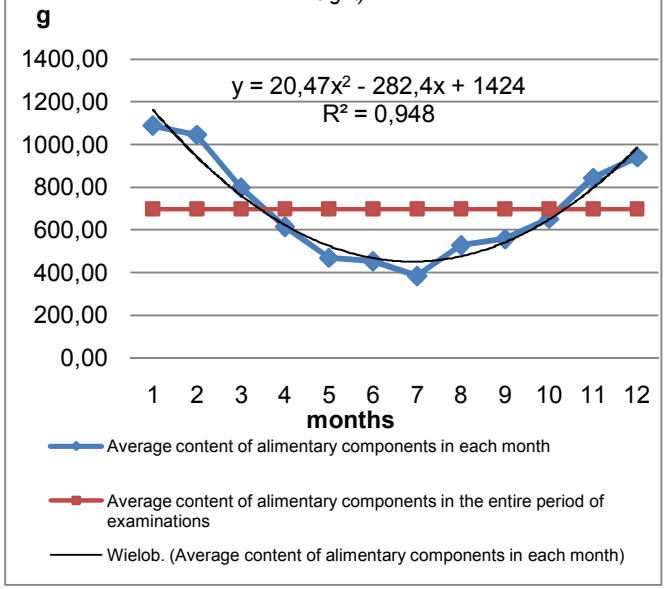


Fig. 5. Organic meter intake by E. bison (kg/500 kg body weight)

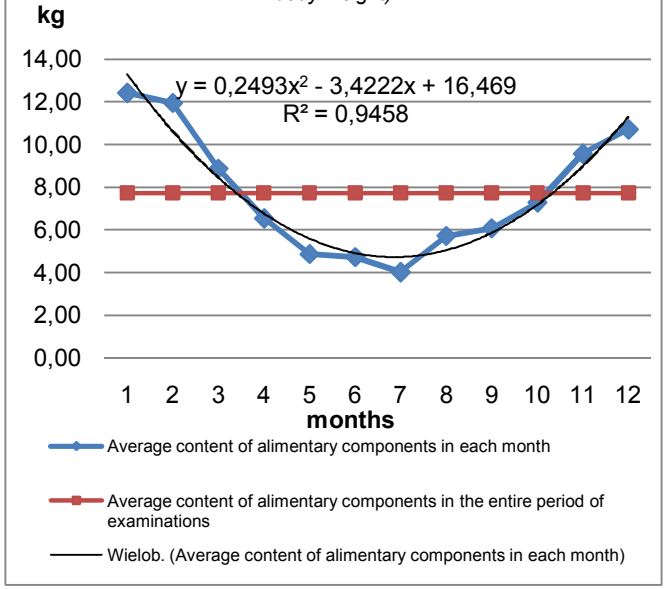
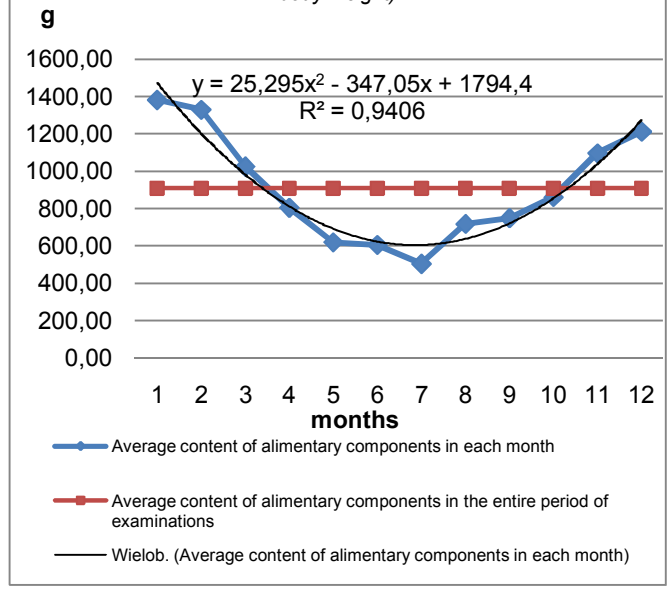


Fig. 6. Crude protein intake by E. bison(g/500 kg body weight)



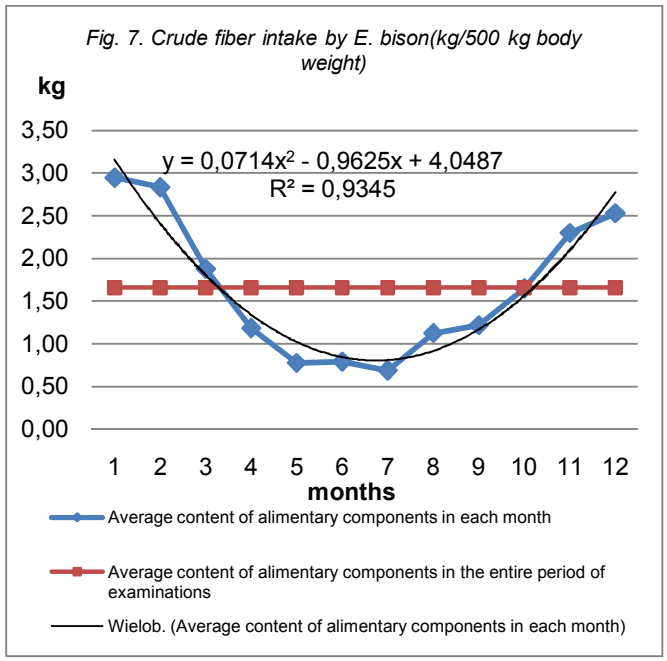


Fig. 7. Crude fiber intake by E. bison(kg/500 kg body weight)

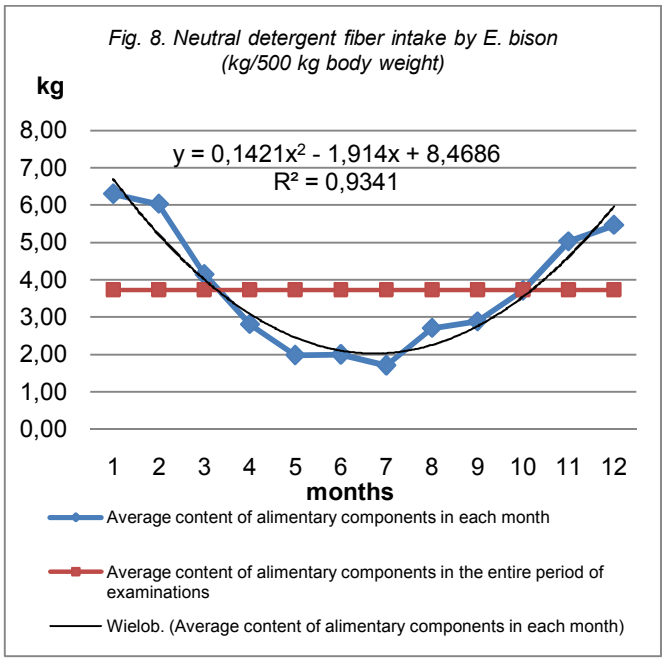


Fig. 8. Neutral detergent fiber intake by E. bison (kg/500 kg body weight)

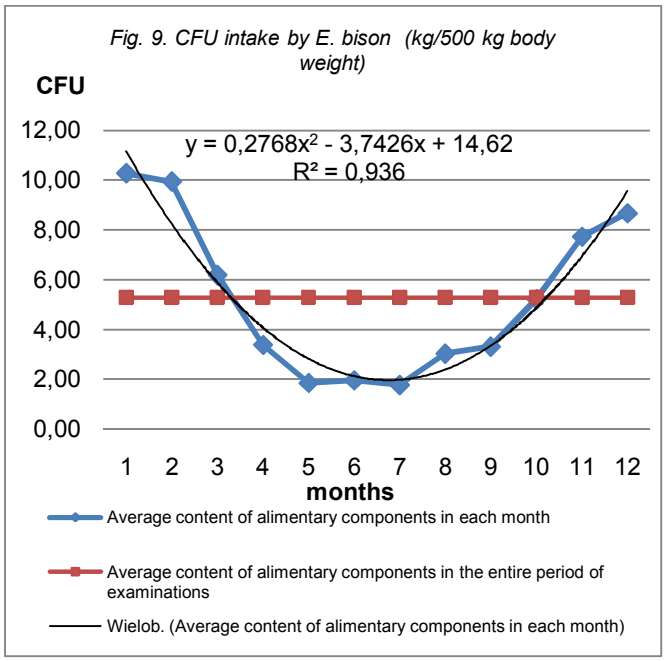


Fig. 9. CFU intake by E. bison (kg/500 kg body weight)

SUMMARY

In feeding European bison in the Forest of Pszczyna the primary source of the energy and nutrients coming from applied from fodders were cereal crops and meadow hay, although in winter season the animals had also access to root crops - beets and carrots.The nutrients analysis of farm fodders showed that a close relationship exists between the quantity of nutrients taken by European bison, and the time of year. The amount of nutrients taken by E. bison clearly depended on the temperature of surroundingsThe largest consumption of fodder components was affirmed in January, and the smallest in July. Supplementing feeding European bison in the Natural Reserve „ Żubrowisko ” delivered nutrients in amounts surpassing nutritional needs of ruminant animals with 500 kg body weight.

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