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EFFECT OF THE GROWING SEASON DURATION OF SORGHUM AND SUDAN GRASS HYBRIDS ON THE CHEMICAL COMPOSITION AND DIGESTIBILITY OF ORGANIC MATTER

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Abstract

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In our experimental study we used the four most commonly grown (in the Czech Republic) sorghum and Sudan grass hybrids from USA (Nutri Honey, Latte, Honey Graze, Big Kahuna) and one hybrid from Germany (Bovital). The aim of the study was to compare these hybrids and to find out the influence of the growing season length on their nutrient composition and digestibility of organic matter. Samples were taken in the first cut, always in 14-day intervals. The crop was sown in early June, sampling started on July 19, 2010 and finished 8 weeks later on September 13, 2010.
When assessing the influence of the growing season's length the following values and development trends were discovered. Constant decreases over the testing period were recorded in nitrogen compounds – by 62 % (133.13 g), easily soluble sugars – 55. 5 % (40.06 g), organic matter digestibility 25.7 % (182.93 g) and NDF (neutro – detergent fibre) digestibility 31.5 % (73.2 g). Increasing trend, on the other hand, was recorded in fibre – by 30.4 % (99.2 g) and its individual components: lignin, NDF and ADF (acido – detergent fibre).
In the second part of the experiment we were studying the differences in nutrient composition and organic matter digestibility between the individual hybrids. Honey Graze was recorded as having the highest average content of easily soluble sugars 57.53 ± 0.43 g, with lowest fibre content (272.13 ± 2.49 g), lowest ADF content (331.4 ± 2.88 g) and NDF content (440.4 ± 4.20 g) and lignin (77.47 ± 0.71 g). This hybrid also showed the best organic matter of (657.07 ± 5.28 g); however, no statistically conclusive differences ($P < 0.05$) in terms of organic matter digestibility were recorded between this hybrid and the other ones. The Bovital hybrid had the highest content of nitrogen compounds over the entire growing season (138.73 ± 0.94 g). Statistically highly conclusive difference ($P < 0.01$) in nitrogen compounds was found between this hybrid and all the other ones (except Big Kahuna). Upon all the indicators, the best rated sorghum and Sudan grass hybrid in terms of nutrient composition and organic matter digestibility was Honey Graze.

sorghum, Sudan grass, nutrient composition, organic matter digestibility, vegetation phase

Global climate changes manifest mainly through drying up of soils and changing distribution of precipitation throughout the year, which leads to increased risk of erosion (SINGH and OLSEN, 2011). These changes in weather and climate inspired the introduction of a new silage fodder crop into the Czech Republic – multi-cut sorghums. The sorghum plants relatively better cope with humidity deficiency during vegetation that causes negative response of most fodder crops in terms of quantity and quality of their yield (DOLEŽAL *et al.*, 2009). According to (DOLEŽAL *et al.*, 2009) sorghum can be considered an alternative and additional high-carbohydrate drought-resistant fodder. The concentration of energy in sorghum and Sudan grass hybrids is comparable to corn and higher than in alfalfa (WHEELER and McKINLEY, 1998). The same results were achieved also by UNDERSANDER

and LANE (2001). According to POŠTULKA *et al.* (2009) sorghum can be actually used to compensate for lower-quality fodders as it contains more Beta-carotene and vitamin C. Hybrids of sorghum and Sudan grass have the greatest potential in our geographic region.

These hybrids are generally higher-bred and demonstrate better health and nutritional characteristics. They are suitable for ensilage, haylage, and biogas production.

Thanks to their extensive root system the plants are excellent in absorbing water. They provide outstanding fodder with high sugar content, in the vegetation phase they contain 14–17% of nitrogen compounds and very well-digestible fibre. According to SEEDSERVICE (2011) one of their greatest advantages, besides the trouble-free health condition, is the low attractiveness for the wild boar and low price of sowing seed.

The greatest success in fodder sorghum hybridization was achieved in USA where the new varieties serve for green fodder production, pasture, as well as for haymaking and ensilage (MILLER and STROUP, 2003; SONON *et al.*, 1991 and others). However, due to the different climate and geographic conditions in USA these results cannot be fully applied to our conditions.

In our experimental survey we used four of the most common (in the Czech Republic) hybrids of sorghum and Sudan grass from USA (Nutri Honey, Latte, Honey Graze, Big Kahuna) and one hybrid (Bovital)from Germany. The aim of the work was to compare the individual hybrids and to find out the influence of the growing season length on their nutrient composition and digestibility of organic matter.

MATERIALS AND METHODS

Sites, hybrids, and treatment methods

Samples were taken at plots owned by VOS zemědělců, joint-stock enterprise seated in Velké Opatovice. The site is located at the elevation of 430 m above sea level, the soil is sandy loam to loamy sand, soil type degraded chernozem. Average annual temperature reaches 8.5 °C, average annual precipitation is 710 mm. Five sorghum and Sudan grass hybrids were sown on this site. The particular varieties were Nutri Honey, Honey Graze, Latte, Bovital and Big Kahuna. These annual multi-cut sorghums are harvested in 2–3 cuts for ensilage or are sown after the main crop and harvested in a single cut in autumn. Each of the hybrids was fertilised at the beginning of the vegetation only: with N in the dose of 60 kg/ha.

Sampling and determination of rumen degradability

The samples were taken during the first cut, always at 14-day intervals. The crop was sown in early June, sampling started on July 19, 2010 and ended after 8 weeks on September 13, 2010. The total of five samplings were performed during this period on the following dates: 1st sampling July 19, 2nd sampling August 2, 3rd sampling August 16, 4th sampling August 30, and 5th sampling September 13. Each sample was taken and analyzed in three repeats. The current height of the crop of the individual hybrids was measured on each of the sampling events. The samples were analysed in the laboratory in S.O.S. Skalice nad Svitavou, s. r. o. for their solids content in accordance with standard ČSN 467092-42 by drying to constant weight at the temperature of 103 ± 2 °C; in this form they were analysed further in terms of main nutrients content and following methods defined and described in Public Notice No. 222/1996 Coll. of the Ministry of Agriculture of the Czech Republic and specified in a paper published by ÚKZÚZ Brno: Methods of laboratory testing of fodder crops, additional substances and premixes I. from 2000. The basic chemical analysis was performed with each of the samples (content of nitrogen compounds, easily soluble sugars, fibre, ADF, NDF, and lignin). Nutrient digestibility were determined by the method „In sacco" described by authors KACEROVSKY *et. al. (*1990). Vegetation height of sorghum was measured by metric system in five repetitions. The average value was calculated from these five measurements and reported in Table III.

Statistic analysis

The Statistica Cz software was used to process statistic data. Dispersion analysis was used to evaluate results. The data is presented as average ± standard error. The results were compared to a significance levels of $P > 0.05$ and $P > 0.01$.

RESULTS AND DISCUSSION

The following values and development trends were detected upon the assessment of the sampling impact. For nitrogen compounds a steady decline was recorded in the testing period: by 62% (133.13 g/kg of solid matter) over the entire growing season, from nitrogen compound content of 214.53 g determined at the first sampling to 81.4 g/kg of solid matter at the last sampling. This decline was most significant between the second and third sampling when the content of nitrogen compounds decreased by 69.1, which is 32.1% of their total amount. WHEELER and McKINLAY (1998) had the same result. They stated that in the period of the sorghum maturation during vegetation the content of nitrogen compounds rapidly decreases while the fibre content is increasing, which reduces the energetic value of the fodder and its rumen degradability. KILCER *et al.* (2005) in north-east USA also recorded the trend of nitrogen compound concentration decrease with the increasing height of the crop. However, they claim that the concentration of nitrogen compounds at harvest can be optimised

by accurate N fertilising and use of barnyard manure.

Decreasing trend was noted also with the low-solubility sugars (LSS), digestibility of organic matter and NDF digestibility. In case of LSS their decrease was 55.5% (40.06 g) over the entire growing season; from 72.13 g content of easily soluble sugars in the first sampling down to 32.07 g in the last sampling. Between the first and second sampling this LSS decrease was lowest, only 5.93 g (i.e. 8.24 %), whereas between the fourth and fifth sampling it was highest (12.46 g i.e. 17.3 %). POŠTULKA *et al.* (2009) also confirmed the decrease of easily soluble sugars during vegetation in these plants: by 56.2% between the first and the last sampling. Digestibility of organic matter decreases by 25.7% during vegetation, which is 182.93 g. The older the crop the more significant is the organic matter digestibility decrease; between the first and the last sampling it was 16.86 g (2.37 %), between second and third it was 23.47 g (3.3 %), between third and fourth 31.2 g (4.38 %), between fourth and fifth 111.4 g (15.65 %). The decreasing digestibility of organic matter, as well as decreasing content of nitrogen compounds and sugars with the increasing age of these hybrids was confirmed also by PŘIKRYL *et al.* (2009). SEEDSERVICE in its materials confirms the decreasing organic matter digestibility as well. There is a similar development trend in NDF digestibility, its decrease during vegetation is by 31.5%, which is 73.2 g.

Increasing trend, on the other hand, was detected with fibre, lignin, NDF, and ADF. Increasing fibre content during vegetation in alfalfa, for instance, is confirmed by ZEMAN *et al.* (2006). The recorded increase of NDF was lowest, specifically 47.3 g, which is 9.9% of the total NDF content in the plant at the end of vegetation. In terms of fibre the increase during vegetation was by 30.4%, i.e. by 99.2 g. POŠTULKA *et al.* (2009) also report increasing fibre content – by 35.5%. The highest increase of fibre content was recorded between the third and fourth sampling, when the fibre content in the plants increased by 32.7 g over the 14 days of vegetation, which represents nearly 33% of the total increase of fibre content. ADF increased by 167.1 g during vegetation, from 250.47 g to 417.53 g in the last sampling. The highest increase was noted for lignin content; its recorded value in the first sampling was 52.7 g and 120.13 g in the last.

During the assessment of the hybrid's influence it was found out that the average content of nitrogen compounds was highest in the Bovital variety: (138.73 ± 0.94 g) over the entire vegetation. Statistically highly conclusive difference in nitrogen compounds content ($P < 0.01$) was recorded between this hybrid and all the others (except Big Kahuny). The highest content of easily soluble sugars was detected in Honey Graze (57.53 ± 0.43 g). Statistically conclusive differences in easily soluble sugars content were found between Honey Graze and all the other hybrids. When comparing Honey Graze with the second most sugar-rich sorghum Latte there was a statistically conclusive difference ($P < 0.05$), and highly statistically conclusive difference ($P < 0.01$) when compared with other hybrids. Honey Graze received good marks for nutrient composition in other indicators when compared with other sorghum and Sudan grass hybrids. This hybrid had the lowest average fibre content of (272.13 ± 2.49 g), lowest ADF content of (331.4 ± 2.88 g), lowest NDF content of (440.4 ± 4.20 g) and lignin content of (77.47 ± 0.71 g). Honey Graze also demonstrated the highest organic matter digestibility (657.07 ± 5.28 g); however, statistically conclusive differences ($P < 0.05$) in terms of organic matter digestibility were not recorded between Honey Graze and other hybrids. The highest NDF digestibility was found in Nutri Honey, (197.13 ± 1.69 g); this hybrid was also the one with the highest fibre content: (290.47 ± 2.49 g), ADF (354.33 ± 2.88 g), NDF (468.73 ± 4.20 g) and highest lignin content (86.13 ± 0.71 g). In all the above stated indicators (NDF digestibility, content of NDF, ADF, fibre, and lignin) statistically highly conclusive difference was recorded between Nutri Honey and Honey Graze ($P < 0.01$). In terms of the individual hybrids and comparison of their height throughout the entire growing season the highest (133 ± 1.35 cm) was Nutri Honey followed by Honey Graze (127.5 ± 1.35 cm). Bovital, on the other hand was the shortest of all (121.3 ± 1.35 cm). Statistically highly conclusive difference ($P < 0.01$) was found between Nutri Honey and all the other hybrids (except Honey Graze). JANOVSKÁ (2011) also came to the conclusion that sorghum and Sudan grass hybrid Nutri Honey reaches the highest average height in comparison with hybrids Latte, Honey Graze and Big Kahuna.

When focusing on the description of mutual interactions between the hybrids in the individual samplings, the most important facts are listed below. In terms of nitrogen compounds content, statistically conclusive differences between hybrids occurred in the very first sampling; in particular it was a statistically highly conclusive difference ($P < 0.01$) between the hybrid with the lowest content of NC, which is Honey Graze (196.3 ± 2.09 g) and between two hybrids with the highest NC (nitrogen compounds) content: Bovital (226.3 ± 2.09 g) and Big Kahuna (227 ± 2.09 g). Statistically highly conclusive difference ($P < 0.01$) in terms of NC was recorded also in the third sampling: between Bovital (116.67 ± 2.09 g) and other hybrids (Nutri Honey 89.3 ± 2.09 g; Latte 93±2.09 g; Honey Graze 92±2.09 g) with the exception of Big Kahuna. In the second, fourth, and fifth sampling, no statistically highly conclusive differences were found between the individual hybrids. Over the entire growing season the highest decrease of nitrogen compounds was recorded in the Big Kahuna hybrid – by 146 g, and the lowest in Honey Graze – by 115.3 g. PŘIKRYL *et al.* (2009) compared Nutri Honey, Latte and Sweet Virginia hybrids in our climatic conditions. In the

first half of the growing season the highest content of nitrogen compounds in his experiment was detected in Latte hybrid, while in the second half of vegetation it was found in Nutri Honey. Statistically highly conclusive differences in the content of easily soluble sugars were recorded between the hybrids in the first sampling: it was between the hybrid with the highest content of easily soluble sugars Honey Graze (79 ± 0.95 g) and two hybrids with the lowest LSS content in the first sampling, Bovital (68.67 ± 0.95 g) and Nutri Honey (67.67 ± 0.95 g). However, these differences were statistically highly conclusive ($P < 0.01$). Besides the highest LSS content in the first sampling, Honey Graze also showed the greatest decrease of this component during vegetation; specifically it was a decrease of 46.7 g, which represents 59.1 % of the original content of easily soluble sugars. On the other hand, the hybrid with the lowest LSS content (Nutri Honey) showed also the lowest decrease – by 35.3 g, i.e. 52.7 % from 67.67 g found in the first sampling, and thus became the last hybrid with the second highest content of this component in the sampling.

In terms of fibre content and its fractions studied in the experiment – ADF, NDF, and lignin – no statistically highly conclusive differences were recorded between the hybrids in the individual samplings. Only the development in ADF and NDF content is interesting in the hybrid between sorghum and Sudan grass Nutri Honey. In the first sampling this hybrid had the highest content of these components, but during the growing season they dropped most dramatically and in the fifth sampling Nutri Honey was the sorghum with the second lowest content of these compounds. In terms of organic matter digestibility and NDF digestibility no statistically conclusive differences were detected in the hybrids during the samplings. PŘIKRYL *et al.* (2009) in their experiment described that over Nutri Honey showed higher fibre content in the first fourteen days of measuring, while in other terms it was the Latte hybrid that showed higher values in this aspect. This development trend in the fibre content in Nutri Honey and Latte was recorded also in our experiment.

The last studied indicator, which was height, brought statistically conclusive differences only in the last sampling. The shortest hybrid, at the end of the vegetation, was Latte with the height of 221 ± 3.02 cm. Statistically highly conclusive difference ($P < 0.01$) was recorded between Latte and two hybrids that were the tallest in the last sampling – Nutri Honey 275.3 ± 3.02 cm and Honey Graze 255 ± 3.02 cm, Between Latte and German Bovital with the height of 250 ± 3.02 cm the difference was just statistically conclusive ($P < 0.05$). KILCER *et al.* (2005) found the average height of 124 cm in crossbreds between sorghum and Sudan grass, with over 250 cm, specifically 264 cm, in the last sampling.

SUMMARY

Recent changes in weather and climate inspired the introduction of a new silage fodder crop into the Czech Republic – multi-cut sorghums. Sorghum is a fodder crop high in carbohydrates and relatively better copes with drought.

Most of the experiences with sorghum cultivation come from USA which is the country of origin of the four of five sorghum and Sudan grass hybrids we tested (Nutri Honey, Latte, Honey Graze, Big Kahuna). The fifth was Bovital, a hybrid from Germany. Samples were taken at fields in Velké Opatovice, always in 14-day intervals, starting on July 9, 2011 and ending on September 13. 2011. Five samplings were performed.

Constant decrease over the entire growing season was recorded with nitrogen compounds – by 62 % (133.13 g), easily soluble sugars – 55.5 % (40.06 g), organic matter digestibility 25.7 % (182.93 g) and NDF digestibility 31.5 % (73.2 g). Increasing trend was recorded with fibre – 30.4 % (99.2 g) and its individual fractions, lignin, NDF and ADF.

The second part of the experiment focused on detecting differences in nutrient composition and organic matter digestibility between the individual hybrids. Hybrid Honey Graze had the highest average content of easily soluble sugars (57.53 ± 0.43 g), lowest fibre content (272.13 ± 2.49 g), lowest ADF content (331.4 ± 2.88 g), NDF content (440.4 ± 4.20 g) and lignin (77.47 ± 0.71 g). This hybrid also showed the best organic matter digestibility (657.07 ± 5.28 g), so it is digestibility over 65%.. However, no statistically conclusive differences ($P > 0.05$) were found between Honey Graze and other hybrids in terms of organic matter digestibility. Regarding nitrogen compounds content, the highest values were recorded with the Bovital hybrid, which had the highest content of nitrogen compounds over the entire growing season (138,73±0,94 g). Statistically highly conclusive difference ($P < 0.01$) in nitrogen compounds was found between this hybrid and all the other ones (except Big Kahuna). Upon all the indicators, the best rated sorghum and Sudan grass hybrid to suit our conditions in terms of nutrient composition and organic matter digestibility was Honey Graze while Nutri Honey received the lowest rating due to not coping with the experimental conditions very well. The average content of nitrogen compounds in Nutri Honey was (124.40 ± 0.94 g), it had the second lowest content of easily soluble sugars (51.8 ± 0.43 g), the highest content of fibre (292.47 ± 2.49 g), NDF (468.73 ± 4.20 g), ADF (354.33 ± 2.88 g), and lignin (83.13 ± 0.71 g). Nutri Honey also showed the lowest digestibility of organic matter of (645.47 ± 5.28 g).

I: *Parameters monitored during the vegetation*

Consumption	N	Height	DM	CP	CFat	CF	ADF	NDF	CL	WSC	CA	DOM	dNDF
		cm	g/kg DM										
1	15	36,60	117,33	214,53	27,13	226,87	250,47	428,80	52,73	72,13	115,87	712,93	232,13
2	15	54,73	147,53	168,93	20,80	252,00	301,13	435,00	61,67	66,20	100,67	696,07	198,73
3	15	105,00	169,60	99,80	16,07	289,33	354,20	459,47	75,87	54,67	85,27	672,60	191,93
4	15	184,53	204,60	87,60	15,53	322,00	404,60	486,67	90,40	44,53	75,73	641,40	182,80
5	15	247,67	225,53	81,40	13,67	326,07	417,53	476,07	120,13	32,07	72,33	530,00	158,93
Mean	75	125,71	172,92	130,45	18,64	283,25	345,59	457,20	80,16	53,92	89,97	650,60	192,91
SEM ANOVA		1,35	0,94	0,94	0,32	2,50	2,89	4,20	0,71	0,43	0,68	5,29	1,69

DM – Dry metter, CP – Crude protein, CFat – Crude fat, CF – Crude fibre, ADF – acido -detergent fibre, NDF – neutro -detergent fibre, CL – Crude lignin, WSC – Water soluble carbohydrates, CA – Crude Ash, DOM – Digestibility of organic metter, dNDF – Digestibility of neutro –detergent fibre, SEM – Standard error of the mean

II: *Monitored parameters for individual hybrids*

Hybrid	N	Height	DM	CP	CFat	CF	ADF	NDF	CL	WSC	CA	DOM	dNDF
		cm	g/kg DM										
Honey Graze	15	127,47	175,07	125,27 ^{B}	19,00	272,13	331,40	440,40	77,47	57,53	94,00	657,07	188,27
Latté	15	124,07	175,60	127,47 ^{B}	18,53	281,33	343,40	455,07	78,00	55,27	88,87	653,87	191,93
Big Kahuna	15	122,87	150,47	136,40 ^{AB}	19,20	282,27	344,80	454,67	80,33	54,13	98,07	649,80	190,87
Bovital	15	121,13	187,73	138,73 ^{A}	20,20	290,07	354,00	467,13	81,87	50,87	83,93	646,80	196,33
Nutri Honey	15	133,00	175,73	124,40 ^{B}	16,27	290,47	354,33	468,73	83,13	51,80 ^{B}	85,00	645,47	197,13
Mean	75	125,71	172,92	130,45	18,64	283,25	345,59	457,20	80,16	53,92	89,97	650,60	192,91
SEM ANOVA		1,35	0,94	0,94	0,32	2,50	2,89	4,20	0,71	0,43	0,68	5,29	1,69

DM – Dry metter, CP – Crude protein, CFat – Crude fat, CF – Crude fibre, ADF – acido -detergent fibre, NDF – neutro -detergent fibre, CL – Crude lignin, WSC – Water soluble carbohydrates, CA – Crude Ash, DOM – Digestibility of organic metter, dNDF – Digestibility of neutro –detergent fibre, SEM – Standard error of the mean

^{A,B} $P > 0.01$

III: *Monitored parameters for individual hybrids during vegetation*

CN	hybrid	Height mean	Height SEM.	DM mean	DM SEM	CP mean	CP SEM.	CFat mean	CFat SEM	CF mean	CF SEM	ADF mean	ADF SEM	NDF mean	NDF SEM	CL mean.	CL SEM	WSC mean	WSC SEM.	CA mean	CA SEM.	DOM mean	DOM SEM	dNDF mean.	dNDF SEM
		cm	cm	g/kg DM																					
1	Honey Graze	32,00	0,58	111,00	1,73	196,33	2,96	28,33	0,67	210,00	5,29	230,67	4,81	397,00	8,72	49,00	0,58	79,00 ^{A}	1,15	123,33	2,33	721,00	17,21	220,00	5,03
1	Latté	42,00	0,58	122,67	1,45	209,67	2,73	26,33	0,88	218,00	3,06	239,67	5,61	411,67	8,74	51,33	0,88	74,67 ^{AB}	0,67	115,67	1,86	714,67	15,51	225,67	4,41
1	Big Kahuna	39,67	0,88	110,67	0,67	227,00	3,51	27,33	1,33	226,33	5,84	250,67	1,86	428,67	4,98	53,00	0,58	70,67 ^{AB}	1,20	118,00	2,65	711,00	13,20	230,00	4,04
1	Bovital	34,67	0,67	122,67	1,33	226,33	2,91	29,33	0,88	233,67	4,84	257,67	5,21	441,33	7,45	54,67	0,88	68,67 ^{B}	1,20	107,00	1,73	709,33	16,97	237,00	3,00
1	Nutri Honey	34,67	0,88	119,67	1,33	213,33	4,26	24,33	1,20	246,33	4,70	273,67	2,96	465,33	10,27	55,67	0,88	67,67 ^{B}	1,67	115,33	1,45	708,67	10,53	248,00	5,86
2	Honey Graze	55,33	0,88	156,33	1,86	166,33	1,20	21,00	0,58	248,67	4,67	298,33	6,12	436,33	4,33	58,67	1,33	69,33	1,20	101,33	1,45	700,67	12,60	201,33	4,18
2	Latté	58,33	1,33	145,00	2,00	171,67	2,73	20,33	0,88	255,33	6,89	304,67	6,49	445,33	9,56	58,67	1,67	68,33	1,76	103,67	2,33	700,00	13,23	203,33	1,33
2	Big Kahuna	54,00	0,58	151,67	1,45	174,33	1,86	21,33	0,33	240,33	5,93	286,00	6,43	411,00	9,50	62,00	1,15	69,33	1,45	106,00	1,00	695,67	9,21	188,33	4,41
2	Bovital	49,00	0,58	151,33	1,20	174,67	3,38	22,33	0,67	256,67	2,96	306,33	7,45	440,00	6,81	63,33	1,86	62,67	0,88	90,67	0,67	691,67	6,96	199,33	3,28
2	Nutri Honey	57,00	1,15	133,33	1,67	157,67	1,20	19,00	1,00	259,00	4,36	310,33	1,86	442,33	7,51	65,67	1,86	61,33	0,67	101,67	1,86	692,33	16,37	201,33	3,18
3	Honey Graze	101,00	2,00	161,67	1,76	92,00	1,15	15,67	0,88	285,00	4,04	347,67	7,69	453,33	9,33	73,67	1,33	57,67	0,88	93,33	2,19	676,67	7,36	190,67	5,21
3	Latté	114,00	2,00	184,67	2,40	93,00	1,00	16,67	0,33	279,00	5,03	341,00	8,08	444,00	8,50	72,67	1,67	56,67	0,88	82,00	1,53	676,00	10,00	185,00	4,73
3	Big Kahuna	105,00	2,52	157,33	2,33	108,00	2,00	17,00	0,58	285,00	2,65	350,33	6,77	453,33	11,84	76,00	2,08	55,00	0,58	93,00	1,00	672,33	14,71	189,33	3,84
3	Bovital	97,00	2,65	162,67	1,76	116,67	2,19	17,67	0,67	296,33	2,91	363,67	8,84	469,67	10,48	77,33	1,45	51,67	0,33	84,67	1,33	671,33	9,84	196,33	1,33
3	Nutri Honey	108,00	1,53	181,67	2,60	89,33	0,88	13,33	0,33	301,33	6,12	368,33	2,85	477,00	10,69	79,67	1,20	52,33	0,33	73,33	1,45	666,67	7,45	198,33	3,48
4	Honey Graze	194,00	3,21	214,33	2,19	91,33	0,88	17,00	0,58	305,33	4,84	382,67	8,33	461,00	11,02	88,67	1,20	47,33	1,20	77,33	1,20	648,00	15,95	176,33	1,20
4	Latté	185,00	4,16	201,67	3,48	90,00	1,53	15,67	0,33	325,67	8,95	410,33	9,77	492,67	10,93	88,33	1,20	45,33	0,33	71,00	1,00	647,00	13,28	185,00	4,36
4	Big Kahuna	178,67	2,85	159,00	2,08	87,67	1,76	16,33	0,88	327,67	7,75	412,33	5,24	496,33	8,69	91,00	2,31	43,33	1,20	92,33	0,67	640,00	8,54	186,00	3,06
4	Bovital	175,00	3,06	248,00	2,65	88,33	1,20	16,00	0,58	330,67	5,78	415,00	6,11	498,33	10,90	92,33	0,88	41,33	0,33	71,00	0,58	637,00	12,77	186,00	2,08
4	Nutri Honey	190,00	3,21	200,00	3,46	80,67	1,45	12,67	0,67	320,67	7,26	402,67	6,57	485,00	7,55	91,67	2,03	45,33	0,88	67,00	1,15	635,00	8,66	180,67	4,91
5	Honey Graze	255,00	5,03	232,00 ^{abB}	1,53	80,33	1,45	13,00	0,58	311,67	3,67	397,67	6,36	454,33	12,77	117,33	2,33	34,33	0,67	74,67	1,67	539,00	5,77	153,00	4,16
5	Latté	221,00	3,21	224,00 ^{aA}	2,31	73,00	1,00	13,67	0,33	328,67	5,78	421,33	5,24	481,67	12,00	119,00	2,52	31,33	0,33	72,00	1,15	531,67	3,33	160,67	3,71
5	Big Kahuna	237,00	4,58	173,67 ^{abAB}	1,76	85,00	0,58	14,00	0,58	332,00	8,39	424,67	5,78	484,00	8,50	119,67	2,40	32,33	0,33	81,00	1,15	530,00	13,05	160,67	1,76
5	Bovital	250,00	6,08	254,00 ^{bAB}	2,52	87,67	1,33	15,67	0,33	333,00	6,51	427,33	5,93	486,33	10,48	121,67	1,67	30,00	0,58	66,33	1,45	524,67	10,48	163,00	3,21
5	Nutri Honey	275,33	6,89	244,00 ^{abB}	2,31	81,00	1,53	12,00	0,58	325,00	5,13	416,67	10,14	474,00	7,37	123,00	1,15	32,33	0,67	67,67	0,88	524,67	7,88	157,33	3,71
Vš.skupiny		125,71	9,34	172,92	5,03	130,45	6,17	18,64	0,60	283,25	4,72	345,59	7,50	457,20	3,52	80,16	2,78	53,92	1,72	89,97	2,06	650,60	7,81	192,91	2,92
Sm. Chyba ANOVA			3,02		2,10		2,09		0,72		5,58		6,46		9,38		1,59		0,95		1,53		11,83		3,79

CN – Consumption, SEM – Standard error of the mean, DM - Dry metter, CP – Crude protein, CFat – Crude fat, CF – Crude fibre, ADF – acido -detergent fibre, NDF – neutro -detergent fibre, CL – Crude lignin, WSC – Water soluble carbohydrates, CA – Crude Ash, DOM – Digestibility of organic metter, dNDF – Digestibility of neutro -detergent fibre, SEM – Standard error of the mean

^{A,B} $P > 0.01$, ^{a,b} $P > 0.05$

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