

## **Influence of the maturity stage of alfalfa (*Medicago sativa* L.) on the chemical composition and *in sacco* organic matter digestibility**

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**Introduction** Ensiling of wilted alfalfa has increased in Czech Republic during the last years. Alfalfa (*Medicago sativa* L.) is the oldest and largest multi-fodder with the highest content of crude protein. Lucerne has also the highest nutritive value (Mitrik, 2006; Holubek et al., 1995 and other). Mitrik (2006) determined that the leaves contained 18–28 % of NDF, 12–20% of ADF and over 30% of CP, while the stems contented 35–70% of NDF, 30–55% of ADF and only 10–20% of total CP. Digestibility of organic nutrients is affected not only by content, fiber but also by the degree of foliage plants, as well as the secondary metabolites, especially phenolic compounds (Scehovic, 1990). Holubek et al. (1995) noted that the nutritional value of alfalfa decreases during development. Simko (1998) and Homolka and Pavelek (2005) discussed a depressive effect of lignin content of alfalfa on organic matter digestibility. The influence of the stage of maturity of alfalfa on the chemical composition and *in sacco* digestibility was studied in a laboratory experiment.

**Material and methods** Green forage alfalfa (variety Palava) of first cut was harvested at regular intervals of vegetation: the formatting of buds (1), at the beginning buds (2), full bud (3), at the end bud (4), early bloom (5), full bloom (6), late bloom (7) and after flowering (mature) of alfalfa (8), each of three randomly selected sites (area 1 m<sup>2</sup>). After cooling and stabilization, the samples were homogenized and over through a sieve with a mesh size 1 mm and then analyzed for organic nutrients (AOAC 1995). Digestibility of organic matter was determined by the modified method *in sacco* described Kacerovsky et al. (1990).

**Results and Discussion** It was discovered that during vegetation there was a statistically significant increase in the crude fiber content and in the ADF and NDF fractions and a reduction in nitrogenous substances. A strong negative correlation was detected between the stage of maturity and content of crude protein and net energy for lactation ( $r = -0.97$  and  $r = -0.92$ , respectively). In the individual stages of vegetation the differences in the content of nitrogenous substances, fiber and fat were statistically significant ( $P < 0.05$ ). The statistically highest content of crude protein (28.97%) was detected in the first stage before bud setting and the lowest (11.97%) in the stage after the fall of blossoms. Later vegetation also had a stronger depressive effect on the content of fat and NEL. The organic matter digestibility ( $P < 0.05$ ) was the lowest in alfalfa in the last stage of sampling (62.6%) when it reached a mere 85.99% of the digestibility at the beginning of bud setting. The highest organic matter digestibility (72.80%) was detected in a sample of young alfalfa prior to bud setting. In the experiment we confirmed a strong and negative correlation ( $r = -0.97$ ) between the crude fiber content and organic matter digestibility.

**Conclusion** In the individual vegetation stages not only the content of total fiber increased ( $r = 0.99$ ), but also the individual ADF and NDF fractions ( $r = 0.99$  and  $r = 0.98$ , respectively). As a result of this phenomenon the organic matter digestibility dropped from 71.80 % to 62.60 %. The concentration of NEL energy decreased from 5.46 MJ/kg to 4.47 MJ/kg of dry matter. Due to this

reduction the potential milk production from 1 kg of alfalfa dry matter decreased from 1.74 kg FCM to 1.43 kg FCM and the dependence of energy on the vegetation stages was very high ( $r = -0.92$ ). The benefit of harvesting alfalfa during the recommended vegetation stage is not only its optimal nutritional value, higher digestibility of organic nutrients, but also more effective production.

The study was funded from the Grant MSM6215648905 “*Biological and technological aspects of sustainability of controlled ecosystems and their adaptability to climate change*”, by the Ministry of Education, Youth and Sports of the Czech Republic.

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**Table 1** Average chemical composition of alfalfa in different stages of vegetation (1 kg of DM)

Stages of Vegetation	%						MJ/k	MJ/k	MJ/k	%	
	CP	Fat	CF	ADF	NDF	Ash	NFE	g DM	g DM		g DM
1	28.97	2.09	21.44	24.46	29.83	13.69	33.81	9.30	5.46	5.28	72.8
2	23.62	1.70	23.26	26.8	32.23	9.86	41.56	9.64	5.68	5.53	71.8
3	23.02	1.64	24.33	28.35	33.32	10.93	40.08	9.08	5.30	5.07	70.3
4	19.59	1.39	24.71	28.94	33.66	9.73	44.58	9.19	5.38	5.18	70.7
5	16.86	1.33	25.61	30.02	34.79	9.82	46.37	8.47	4.89	4.58	67.5
6	14.76	1.13	27.58	32.82	36.99	9.33	47.20	8.06	4.68	4.37	67.1
7	15.6	1.26	28.74	33.66	39.01	9.40	45.00	8.42	4.85	4.53	65.5
8	11.97	1.23	30.12	36.18	39.92	8.91	47.78	7.64	4.47	4.16	62.6

CP = crude protein; ADF = acid detergent fiber; NDF = neutral detergent fiber; NFE = N free extractives value; ME = metabolisable energy; NEL = net energy for lactation; NEV = net energy for fattening; DOM = digestibility of organic matter