

## THE INFLUENCE OF THE ZEOLITE TYPE "TUFOZEL" ON DAIRY COWS REPRODUCTIVE CHARACTERISTICS<sup>1</sup>

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*Contents:* The experiments were performed on 24 dairy cows of domestic Simmental race. During the examination, forage mixtures were used through which mineral zeolite of "tufozel" type was added. The experiment lasted for 15 months. Data characterizing reproductive features were taken during the experiment. Adding zeolite influenced the improvement of some reproductive characteristics.

Musty food can contain plenty of toxins which may have an adverse impact to health condition of the animals and at the same time to reproductive features. It leads to growth decrease and increase of food consumption per product unit with all species and categories of the animals. Mycotoxicosis is not cured but simply prevented if possible.

As for reproductive and fertility characteristics, the following were examined: duration of gravid period, duration of service period, duration between calving, weight of calves at the moment of delivery and fertility.

*Key words:* dairy cows, forage mixtures, zeolite, tufozel, reproductive features.

### *Introduction*

Musty food can contain plenty of toxins which may have an adverse impact to health condition of the animals and at the same time to reproductive features. It leads to growth decrease and increase of food consumption per product unit with all species and categories of the animals. Mycotoxicosis is not cured but simply prevented if possible.

Lately, more and more attention in respect of mycotoxicosis prevention is given to zeolite usage as mycotoxins' absorbent, *Rajić et al.* (1991).

Foodstuff influences the reproductive indicators and reproduction through mycotoxins but the other characteristics of cows as well, *Harvey et al.* (1991), *Neustroyev et al.* (1995), *Nešić*, (2000), emphasize justification of using zeolite in foodstuff for cows in lactation.

The objective of this research is to examine in what extent zeolite as a forage additive in preparation of "tufozel" type shall affect the reproductive characteristics of dairy cows.

### *Materials and methods*

The experiments were performed on 24 dairy cows of domestic Simmental type. Cows were divided into three groups, eight heads per group. Groups were formed based on the quantity of added tufozel in meals so there was control group (K-group) consisting of eight cows not getting tufozel, first experimental group (I-O) with tufozel addition of 3% and second experimental group (II-O) with tufozel addition of 2% in meals.

All heads were situated in bricked facilities with combined tied and free system of keeping. Ambient conditions were identical for all cows with small deviations. Cows weighted 500 to 600 kg.

As for reproductive and fertility characteristics, the following were examined: duration of gravid period, duration of service period, duration between calving, weight of calves at the moment of delivery and fertility.

### *Results and discussion*

Duration of gravidity period is largely influenced by genetic indicators so it can slightly be affected by external factors. In table 1 and graphic 1 the average duration of gravid period and variability depending on calf sex, is shown.

<sup>1</sup> Original scientific paper – Originalni naučni rad

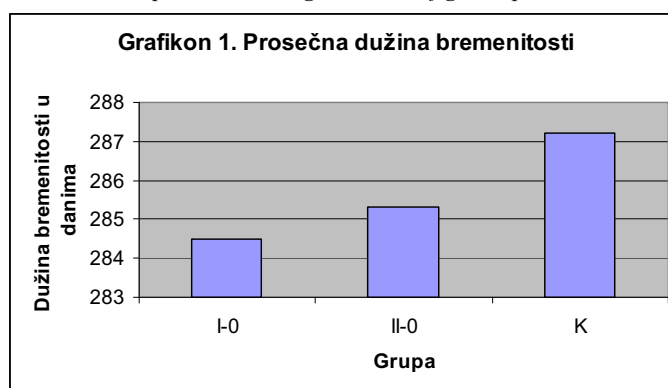
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Table 1. Duration of gravid period and variability depending on calf sex

Group	Calf sex	N	$\bar{X}$	$s_x$	SD	CV(%)	Variations		Fexp
							min	max	
I-O (3%)	♂	4	298.5	190.55	329.66	115.47	285	286	1.52ns
	♀	4	283.3	163.68	327.36	115.47	282	285	
II-O (2%)	♂+♀	8	284.5	107.47	304.15	107.04	282	286	
	♂	4	286.2	165.27	330.54	115.49	285	290	
K	♀	4	284.5	164.25	328.51	115.49	283	285	
	♂+♀	8	285.3	107.80	315.08	106.93	283	290	
	♂	5	290.7	159.78	319.57	109.91	285	294	
	♀	3	283.7	205.08	354.79	125.03	285	294	
	♂+♀	8	287.2	108.52	307.12	106.94	285	294	

N.S. – P>0.05; \* - P<0.05; \*\* - P<0.01; \*\*\* - P<0.001

Graph 1. The average duration of gravid period



It is seen, both in the table and graphic, that the average gravid period duration with cows in K-group lasted for 287.2 days (62.5% male and 37.5% female calves), with cows in I-O group lasted for 284.5 days (50% male and 50% female calves), and with cows in II-O group lasted for 285.3 days (50% : 50%).

A general observation is that the average gravid lasted longest with control cow group (287.2 days), then in II-O group (285.3 days), while the shortest average gravid period was in I-O group (284.5 days). Differences in length of gestation period were not statistically important (P>0.05). Values of standard deviations, variation coefficient and standard arithmetic mean mistakes are big because number of cows in the experiment was relatively small.

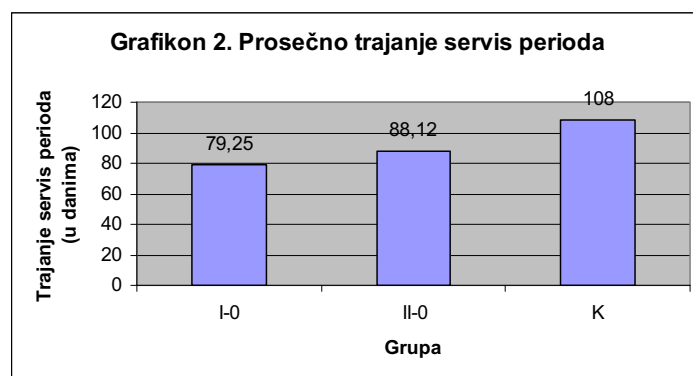
Duration of service period may be affected significantly by the external factors, which has been used for gaining good results in the experiment. The average duration of service period and variability per groups are shown in table 2 and graphic 2.

Table 2. Duration and variability of service period

Group	N	$\bar{X}$	$s_x$	SD	CV(%)	Variations		Fexp
						min	max	
I-O 3%	8	79.25	18.17	51.24	64.65	51	220	55.60**
II-O 2%	8	88.12	35.04	98.82	112.15	63	141	
K	8	108.00	47.79	134.79	124.80	66	270	

N.S. – P>0.05; \* - P<0.05; \*\* - P<0.01; \*\*\* - P<0.001

Graph 2. The average duration of service period



The average service period duration with the cows in I-O group was 79.25 days, in II-O group 88.12 days and in K-group 108 days. Cows in the first experimental group had the shortest service period duration, then cows in the second experimental group while the cows in the control group had the longest service period duration. Difference in service period duration, per groups, was statistically very significant ( $P < 0.001$ ). *Trifunović et al.* (1990), consider service period gained in the I-O and II-O group, from 71 to 90 days, as very good, while control group service period had, according to the same source, satisfactory duration (91 to 110 days).

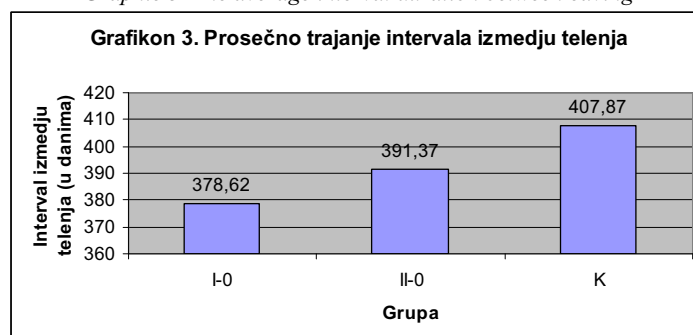
In table 3 and graphic 3, the average interval duration between calving were shown.

Table 3. Duration and variability of interval between calving

Group	N	$\bar{X}$	$s_x$	SD	CV(%)	Variations		Fexp
						min	max	
I-O 3%	8	378.62	144.09	407.78	107.70	335	475	
II-O 2%	8	391.37	149.91	427.27	108.41	342	555	1.92ns
K	8	407.87	155.09	427.27	107.61	345	490	

N.S. –  $P > 0.05$ ; \* -  $P < 0.05$ ; \*\* -  $P < 0.01$ ; \*\*\* -  $P < 0.001$

Graphic 3 The average interval duration between calving



The shortest interval between calving was noticed with the cows in the group I-O with average duration of 378.62 days, then group II-O with duration of 391.37 days, while the cows in K-group had average interval duration between calving of 407.87 days.

The difference in demonstration of inter-calving intervals is not statistically significant ( $P>0.005$ ). Interval duration between calving according to many authors and *Gutić*, (1998), should be from 330 to 404 days, that is to say, 11 to 13 months. Cows in the I-O group and in II-O stay within these limits while the control group cows have slightly longer inter-calving interval than optimal.

Weights of calves at the moment of delivery and their variability depending on calves' sex and type of delivery are shown in the table 4. Variability of this feature is among the most moderate examined features.

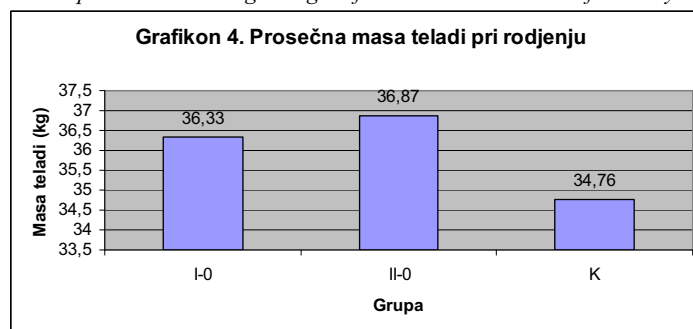
Table 4. Weights of calves at the moment of delivery and variability

Group	Calf sex	N	$\bar{X}$	$s_x$	SD	CV(%)	Varia tions min max	Fexp
I-O (3%)	♂	4	38.00	21.94	43.88	115.47	37 39	2.23ns
	♀	4	34.75	20.08	40.16	115.56	33 37	
	♂+♀	8	36.33	13.76	38.94	107.18	33 39	
II-O (2%)	♂	4	38.00	21.94	43.88	115.47	37 39	
	♀	4	35.75	20.64	41.28	115.46	35 36	
	♂+♀	8	36.87	13.93	39.44	106.97	35 39	
K	♂	5	35.20	17.60	39.43	112.02	32 38	
	♀	3	34.33	24.33	42.10	122.63	32 36	
	♂+♀	8	34.76	13.19	37.35	107.45	32 38	

N.S. –  $P>0.05$ ; \* -  $P<0.05$ ; \*\* -  $P<0.01$ ; \*\*\* -  $P<0.001$

Average weight of calves at the moment of delivery is clearly seen from graphic 4.

Graphic 4 The average weight of calves at the moment of delivery



The average calves' mass is the smallest in the control group and is 34.76 kg, bigger is in group I-O which is 36.33 kg and the biggest is with group II-O, 36.87 kg. Differences in calves' mass were not statistically significant ( $P>0.05$ ). *Petrović*, (1998) and *Kress et al.* (1990) got the similar calves' mass in their researches. One calving per year is considered as optimal fertility.

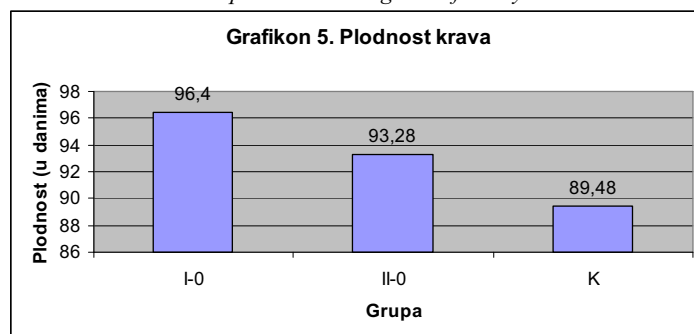
In table 5 and graphic 5 average cows fertility is shown according to groups.

Table 5. Fertility and variability of fertility

Group	N	$\bar{X}$	$s_x$	SD	CV(%)	Varia tions min max	Fexp
I-O 3%	8	96.40	35.94	101.71	108.06	74 108	37.69**
II-O 2%	8	93.28	36.94	103.57	110.42	79 105	
K	8	89.48	36.08	102.11	111.53	65 106	

N.S. –  $P>0.05$ ; \* -  $P<0.05$ ; \*\* -  $P<0.01$ ; \*\*\* -  $P<0.001$

Graph 5. The average cow fertility



The smallest average fertility is with cows of K-group, 89.48, bigger with cows in group II-O, 93.28 and the biggest with the cows of group I-O, 96.40. Harmonization of reproduction parameters has given good fertility which is in line with the results quoted by *Gutić et al.*(1997). Differences in fertility of cows determined by the analysis of variance were statistically very significant ( $P < 0.001$ ).

#### Conclusion

Adding of mineral zeolite in shape of “tufozel” preparation influenced reproductive features of dairy cows.

The average gravid period duration has appeared to be the highest with the cows in K-group (287.2 days), less with cows in II-O group (285.3 days) and the least with cows in I-O group (284.5 days). These differences were not statistically significant ( $P > 0.05$ ).

Service period duration was the longest with the cows in K-group (108 days), shorter with cows in II-O group (88.12 days) and the shortest in group I-O (79.25 days). Service period duration differences were statistically very significant ( $P < 0.001$ ).

Duration of the interval between calving was longest with the cows in K-group (407.87 days), then in group II-O (391.37 days) and shortest in group I-O (391.37 days). Difference was not statistically significant ( $P > 0.005$ ).

Average mass of calves at the moment of delivery is smallest in K-group (34.76 kg), bigger in group I-O (36.33 kg) and biggest in group II-O (36.87 kg). Differences were not statistically significant ( $P > 0.05$ ).

The lowest fertility is in control cow group with value of 89.48%, then in group II-O, 93.28%, and the highest in group I-O, 96.40%. Difference between the lowest and the highest fertility is 6.92%. Differences in cows' fertility determined by the analysis of variance were statistically very significant ( $P < 0.01$ ). Eventually, it is seen here, that the real significance of zeolite usage in feedstuff is actually when there are more than 6.72 calves per 100 cows.

## UTICAJ ZEOLITA TIPA “TUFOZEL” NA REPRODUKTIVNE OSOBINE KRAVA MUZARA

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#### Rezime

Dodavanje minerala zeolita u vidu preperata “tufozel” imalo je uticaja na reproduktivne osobine krava muzara.

Prosečna dužina bremenitosti pokazala je najveće vrednosti kod krava K-grupe (287.2 dana), manje krave II-O grupe (285.3 dana) i najmanje krave I-O grupe (284.5 dana). Statistički ove razlike nisu bile značajne ( $P > 0.05$ ).

Trajanje servis perioda bilo je najduže kod krava K-grupe (108 dana), manje kod krava II-O grupe (88.12 dana) i najmanje kod I-O grupe (79.25 dana). Razlike u trajanju servis perioda statistički su bile vrlo značajne ( $P < 0.001$ ).

Trajanje intervala između teljenja bilo je najduže kod krava K-grupe (407.87 dana), zatim II-O grupe (391.37 dana) i najkraće kod I-O grupe (391.37 dana). Razlika nije bila statistički signifikantna ( $P > 0.005$ ).

Prosečna masa teladi pri pri rođenju najmanja je kod K-grupe (34.76 kg), veća kod I-O grupe (36.33 kg) i najveća kod II-O grupe (36.87 kg). Razlike nisu statistički signifikantne ( $P > 0.05$ ).

Najmanja plodnost je u kontrolnoj grupi krava sa vrednošću od 89.48%, zatim u II-O grupi 93.28%, i najveća u I-O grupi 96.40%. Razlika između najmanje i najveće plodnosti iznosi 6.92%. Razlike u plodnosti krava utvrđene analizom varijanse bile su statistički vrlo značajne ( $P < 0.01$ ). Tek ovde se vidi pravi značaj upotrebe zeolita u ishrani kada na 100 krava imamo više 6.92 teleta.

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