

THE EFFECT OF INCLUDING PEAS IN THE COWS' RATION ON THE MILK PRODUCTION

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ABSTRACT

After calving, cows may lose up to 0.7 kg of their corporal weight daily. This is why the experience was made with cows after 90-100 lactation days, and the use of peas in the cows' rations has a much better forage efficiency in this lapse of time.

The average milk production for the control lot was 34.7 kg / day / cow \pm 1.36 kg standard deviation, and for the experimental lot 35.4 kg / day / cow \pm 1.04 kg standard deviation. It is found an extra quantity of 0.7 kg milk for the experimental lot in report to the control lot. The milk production standardized to 3.5% fat, was for the control lot 34.61 kg/day / cow , \pm 1.30 kg standard deviation, and for the experimental lot, 35.89 kg/day / cow \pm 1 kg standard deviation. We obtained an extra quantity of 1.280 kg milk.

INTRODUCTION

The peas may replace the soybean meal when the non-degradable protein necessary is lower as it is in the second part of the lactation or at its end, but also in the commercial farms having a modest milk production (under 20 litres/day).

The energetic content of peas is similar to the one of maize and wheat. The starch content of peas varies between 41% and 54% of the dry substance (S.U.). The starch has a slow ruminal degradability rate. Such a degradability helps to maintain the pH over 6.0. A pH under 6.0 determines the decrease of the fibre digestion, of the S.U. consumption and of the fat percentage of milk.

Due to the slow degradation of the non-structural carbohydrates of peas, the fat percentage of milk is higher for the cows foddered with peas comparing to the ones foddered with soybean meals and cole. The slow degradation of starch prevents the decrease of the ruminal pH, avoiding thus the cellulose inhibition.

MATERIAL AND METHOD

The purpose of this research referred to the evaluation of the effect of the partial substitution of soybean meals and of grain maize, by peas, on the production, the milk production.

The experiment was developed in 2011 at S.C.D.A. Șimnic-Craiova and it contained 6 Holstein Friza cows, at the second lactation. Two forage rations were formulated, a control one and an experimental one, according to table no. 1

The animals were foddered by the control ration for two weeks, and then there were made groups of 3, based on the lactation days, the milk production and the corporal weight. The first group of cows had, at the beginning of the experimentations, 110 ± 29 lactation days, 27.4 ± 4.6 kg of milk per day with $3.35 \pm 0.23\%$ protein and a corporal weight of 665 ± 79 kg. The second group of cows had, at the beginning of the experimentations, 107 ± 49 lactation days, 28.1 ± 3.6 kg milk per day with $3.34 \pm 0.20\%$ protein and the corporal weight of 667 ± 65 kg. The first two forage weeks were for adaptation. In the next 6 weeks, the two groups of cows randomly received the control ration and the experimental ration (with 15% peas in S.U).

Table 1

Ingredients of the ration and chemical composition

Ingredientes	Ration (% of the dry substance)	
	Control	Experimental
Lucerne hay	27,0	27,0
Maize silo	25,0	25,0
Grain maize	19,0	11,5
Soybean meal (48 % PB)	7,4	1,6
Peas	-	15,0
Brewery mash	7,0	6,0
Grain barley	12,5	11,8
Vitamin-mineral premix	2,1	2,1
Composition		
Gross protein	15,6	15,2
Neutral detergent fibre	35,0	38,1

39.5% of the grain maize was replaced and also 78.4% of the soybean meal (in S.U.), of the control ration by 15% S.U. peas, in the experimental ration. The proportion of the other ingredients is almost similar for the two rations. The peas was grinded with a mill having hammers and a sieve of 2 mm. All the forage ingredients were mixed once a day, forming a "Total mixture ration" (R.t.a.), which was administrated ad lib twice a day (at 7am and at 5pm), with non-consumed leftovers contained between 5 and 10%. All the cows had access to water and to the salt blocks during the entire experimentation. We took daily individual samples of the volume forage, the total mixture ration and the non-consumed leftovers and every week, we took samples of the concentrates.

The milk production was registered during the entire experimentation. The cows were milked "in a bottle" twice a day, at 6am and at 6pm. The milk samples were taken the last day of the second week of the accommodation period and the last day of the second, the third, the fourth, the fifth and the sixth week of the experimental period. The samples were analysed in order to determine the fat and protein content. In this purpose, the ECOMILK ULTRASONIC MILK ANALYSERS device was used.

RESULTS AND DISCUSSIONS

The genetic potential is usually expressed immediately after calving, as the cow is under the pressure of producing a very big quantity of milk. At this level, the cow has a limited capacity of ingesting the necessary quantity of forage, as there is a mobilization of the corporal fats for finding an energetic balance. A cow's ability to mobilize the corporal fats is correlated to the genetic potential (the cows having a very high genetic potential mobilize the corporal fat for a much longer lapse of time than the cows having a lower genetic potential). After calving, the cows may lose up to 0.7 kg per day of their corporal weight. This is why the experience was made with cows after 90-100 lactation days, and the use of peas in the cows' rations has a much better forage efficiency in this lapse of time.

Table 2 presents the S.U. consumption, the physical milk production, the milk production adjusted to 3.5% fat, the fat and protein percentage and the forage efficiency (EF) for the two lots of animals (the control one and the experimental one – including peas in a percentage of 15% of S.U. of the ration

Table 2

The effect of including peas in the milk cows' ration regarding the consumption of S.U. and of the milk production and composition

Ingredients	Ration				Differences (Experimental - Control)	
	Control		Experimental		± kg.	Statistical signification of the differences
	\bar{X}	± DS	\bar{X}	± DS		
SU consumotion kg/day	23,00	0,50	23,15	0,30	+0,15	Ns*
Milk production kg/day	34,70	1,36	35,40	1,04	+0,70	Ns*
Milk with 3,5% fat kg/day	34,61	1,30	35,89	1,00	+1,28	Increasing tendency
Milk fat %	3,49	±0,1	3,60	0,20	+0,11	Ns*
Milk protein %	3,21	±0,1	3,20	0,10	-0,01	Ns*

*NS – insignificant; **p value higher than 0,05 and lower than 0,10

The dry substance consumption (S.U.)

The average of the dry substance consumption (S.U.) of the control lot was 23 kg ± 0.5 kg standard deviation (DS), and the one of the experimental lot, 23.15 kg ± 0.3 kg standard deviation. The difference between the two values is 0.150 extra consumed kilograms for the experimental lot.

By including peas in the milk cows' ration, it is not found a refusal of the animals to consume the experimental ration. The peas ration is very well accepted, registering thus an easy tendency to increase the consumption (+0.150 kilograms in report to the control lot).

The total milk production

The average milk production of the control lot was 34.7 kg / day / cow ± 1.36 kg standard deviation, and the one of the experimental lot was 35.4 kg / day / cow ± 1.04 kg standard deviation. It is found an extra quantity of 0.7 kg milk at the experimental milk in report to the control milk. Statistically, this difference is not significant.

The introduction of peas in the cows' ration had no significant influence on the milk production. However, there is an increasing tendency of the milk production with 0.7 kg/day and per cow. The milk production standardized at 3.5% fat was, for the control lot, 34.61 kg/ day / cow, ± 1.30 kg standard deviation, and for the experimental lot, 35.89 kg/ day / cow ± 1 kg standard deviation. 1.280 extra kg of milk were obtained. Statistically analysed, this difference is insignificant (p > 0.05). Since the p value is under 0.1, we may state that the experimental peas ration included for foddering the cows has the increasing tendency of the milk production corrected to 3.5% fat percentage.

The fat quantity accomplished for the control lot was 1.211 kg (34.7 x 3.49%), and for the experimental lot, 1.274 kg (35.4 x 3.6%), with an increase of 0.063 kg in report to the control lot.

The protein quantity accomplished for the control lot was 1.114 kg (34.7x3.21%) and 1.137 kg (35.4 x 3.20%) for the experimental lot. This shows a similar profile of the amino acids of the two rations and in quantities approximately equal for absorption, at the small intestine level.

We should mention the fact that the energetic evaluation of the rations did not use adjusting factors (adjusting factors as a consequence of processing the cereals or all the

ingredients of the ration and adjusting factors of the forage consumption).

The cereal processing may improve the nutritive value due to the changes of the rates and of the digestions place. The physical processing (grinding, breaking, etc.), de usually does not lead to the change of the composition of the cereal nutrients, but it determines an increase of the starch digestibility.

CONCLUSIONS

1. The peas produced at S.C.D.A. Șimnic is an acceptable source of nutrients and it may be included in the milk cows' ration, with minor restrictions.

2. The data of the achieved experimentations suggest that the inclusion of peas in a 15% percentage (of the S.U. of the ration) in the milk cows' ration has no significant impact of the forage consumption and on the milk production. However, it is found an increasing tendency of the S.U. consumption with 0.150 kg and an increase of the milk production corrected to 3.5% fat of 1.280 kg of milk (in report to the control ration including soybean meal).

3. Based on the results obtained in the achieved experimentations, peas may be successfully cultivated, accomplishing thus an alternative forage source for cattle.

4. We may replace a part of the soybean meals in the milk cows' ration, when the necessary non-degradable protein is smaller (in the second part of the lactation or in the commercial farms having a production under 20 kg of milk per cow).

5. Due to the variability of the compositional quality, the peas should be analysed in the laboratory before including it in the ration. It is necessary to determine the fibre content (fibre of acid detergent or fibre of neutral detergent) for estimating the net energy of milk, the total digestible nutrients and the relative value and quality of the forage.

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