

CURRENT ASPECTS AND SOLUTIONS IN DAIRY CATTLE NUTRITION

SUVREMENI PRISTUPI I RJEŠENJA U HRANIDBI MLIJEČNOG GOVEDA

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SUMMARY

Dairying in Europe as well as in Slovenia is entering a period of economic and political pressure, which will lead to a new drive for efficiency in milk production on the farm. Intensive milk production and dependence on imported feedstuffs are no more in the foreground of the new livestock development strategy. New strategy demands a much greater self-reliance and that presumes lower milk yield per cow and a new concept in dairy cattle nutrition. A new strategy in dairy cattle nutrition is based on a new definition of a high yielding dairy cow after involved milk quotas and lower milk price, it is not a cow with high milk yield, it is a cow that can produce more profit. Attention in milk production must also be focused on the overall issues of rural development, preservation of environment, animal welfare and human health. The objective of this paper is to review the principles of nutrition management program introduced and developed in Slovenia which govern profitability in milk production based on high roughage rations and is connected with fertility and herd health management. Investigations and direct professional work on model farms and the results obtained on the best farms show clearly that with proper management on an average Slovenian dairy farm it is possible to increase net income by 30 percent.

Key words: dairy cattle, nutrition, management, economy

INTRODUCTION

Once the objectives of dairy farming were simple: to produce wholesome milk in large quantities and as cheaply as possible. Recently dairy farmers and their advisers have been subjected to a barrage of new conflicting incentives and constraints. Genetic and technological developments in dairy farming have been tremendous over the last decades. Animal breeders achieve high production of milk solids per cow over

a remarkably short period of time simply by selection for the desired traits without needing to ask any questions as to what place inside the cow to bring this out. These developments have resulted in more cows handled per man and per unit area, and have increased productivity, making dairy farming more intensified and larger scaled. The

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profitability in milk production has become more and more depending on high yield per cow in a high input system. Dairy farming in Europe expanded on a basis of imported feedstuffs. At the same time because of milk overproduction markets became more competitive which resulted in a smaller profit margin per animal unit. To solve the overproduction problems in Europe milk quotas were introduced and there is a strong tendency to lower milk price. However, when one starts asking more subtle questions, like Webster (1993): "Was the increase in milk production accompanied by an increase in food conversion or an increased predisposition to production disease?" or "Can also BSE (bovine spongiform encephalopathy) be connected with the overeating disease in without consideration a high input system?" (Orešnik, 2001), then it becomes increasingly unsatisfactory to think only in terms of inputs and outputs entering and leaving a cow or a farm. Changes are taking place and to survive we shall have to develop skills removed from standard intensive milk production.

Dairying in Europe as well as in Slovenia is entering a period of economic and political pressure, which lead to a new drive for efficiency in milk production on the farm. Food production is no longer the main priority in the majority of countries. Attention must be focused on the overall issues of rural development, preservation of the environment, animal welfare and human health and not simply how to increase supplies of milk and meat.

Because of all that there is still a demand to ensure milk production economics. That is why we have to change the system. The most important factors associated with profits in milk production are:

Herd size, Milk yield per cow, Milk composition, Milk quality, Stocking rate, Feed costs, Fertility of cows, Herd health status, Longevity.

So far milk yield per cow, herd size, milk composition and quality have predominated acted in economy. In these circumstances the high input system is the most effective. A steady increase in yield per animal is assumed to be the best or even the only way to achieve or sustain acceptable farm income. Milk overproduction, environmental problems, milk quotas, lower milk price and finally the BSE problem have been the reasons for a

dramatical change in European agricultural policy. Intensive milk production and dependence on imported feedstuffs are no more in the foreground of the new livestock development strategy. Competitive low input dairy cattle systems are proposed. New strategy demands a much greater self-reliance presuming lower milk yield per cow and a new (old) concept in dairy cattle nutrition.

The smaller the farm the greater is the need for raising output per ha of land to the maximum, if the herd size is the limiting factor. On larger farms a profitable solution is to produce as much milk as possible from home-grown roughage. This is possible by the production of high quality roughage and by optimal utilisation of used nutrients in proper nutrition management system. Wasteful use of concentrates is avoided. Higher amount of milk from roughage strongly supports the profitability in milk production.

The greatest single problem today is probably that of cows failing to breed regularly. The infertility problem, rather than actual sterility, is under active investigation. Nutritional problems connected with high milk yield are known to be a significant reason for this economically important problem. In all cases herd replacement costs are reduced by extending the herd life of dairy cows on intensive farms well beyond the present average of 3 - 4 lactations. This means better control of reproduction and diseases in a herd. Production diseases, lameness and mastitis are easier to prevent in a lower milk yield herd. Sick animal care is often the least potential for long-term success and profitability for the farmer.

A new strategy in dairy cattle nutrition is based on a new definition of a high yielding dairy cow. It is not a cow with high milk yield, it is a cow that can produce more profit. The main goal in modern milk production is oriented to the reduction of costs - a low input system has to be developed. The cost reduction can be achieved by improving herd health and fertility and by high milk yield from home-grown roughage with reasonable use of concentrates. A proper nutrition management program is oriented to support all these demands. In the last twenty years we have developed a successful nutrition and fertility management program in accordance with new objectives in dairy cattle production adapted to the conditions on Slovenian dairy farms.

METHODS

Milk production is an intensive system of land use, giving returns per hectare similar to cash cropping, dependent mainly on the utilisation of grass, hay, grass-and maize silage. The objective of this chapter is to review the principles of the nutrition management program development and introduction in Slovenia (Orešnik, 1996) which governs profitability in milk production based on high roughage rations.

The first step in the system is growing and conservation of sufficient amounts of roughage on the farm (Orešnik, 1994a). The methods to produce roughage of high quality are the predominant postulation. These methods are well known and not always easy to practice.

Nutritive value of different produce has to be evaluated out of chemical analyses of samples. In Slovenia since 1999 (Orešnik, 1998) energy evaluation of feeds and energy requirements for dairy cows has been calculated after NEL/MJ (net energy for lactation/mega joule) accepted in Germany and Austria (DLG, 1997). The digestibility coefficients, which are the basis for feedstuff energy evaluation, have to be selected out of DLG tables after crude fibre content (%) in the organic matter of clearly described and analysed test sample. Additional methods of feedstuffs quality evaluation (in vitro digestibility of dry and organic matter after Tilly and Terry, Hohenheim gas test, detergent fibre analyses) enable the preparation of accurate basis for energy evaluation of roughage produced in Slovenia. A new system for the evaluation of the protein supply and protein quality control has been proposed and introduced since 1997 (Verbič and Babnik, 1996, 1998). It is based on the British metabolisable protein. Factors influencing protein degradability in grass growing and conservation are controlled. Structural crude fiber functions in daily ratio are under special control. Mineral and vitamin levels are adapted to the known requirements. Our approach to the diet calculation differs from the classical diet formulation.

It is based on predicted and actually established dry matter intake of cows. Feeding standards are adapted to optimal nutrient concentrations and to proportions of different

nutrients in the dry matter ratio. Reasonable concentrate and feed use is recommended after the established milk yield of cows. High yielding cows have to consume more roughage and the composition of concentrates has to follow the change in high roughage diet.

The most sensible to malnutrition is the cow in the dry period and in the first weeks after calving. Special instructions for feeding cows in these periods are prescribed. The essential part of the developed nutrition management system is the control of the system efficiency and detection of nutrition failures. This control is organised by regular monthly following of changes in milk composition (protein, fat, lactose, urea) and not only by the control of persistency in milk yield. The control of fertility and herd health belongs to the system (Orešnik, 1993, 1995).

RESULTS

In the last ten years the effect of better nutrition management on farms in Slovenia is evident (Table 1).

Table 1. Average milk yield per cow on controlled farms in Slovenia

Tablica 1. Prosječni prinos mlijeka po kravi na kontroliranim farmama u Sloveniji

Year Godina	No. of cows Broj krava	Milk yield Proizvodnja mlijeka kg	Fat Masti %	Protein Bjelančevine %
1981	18.809	3746	3.78	-
1991	43.223	3886	3.80	3.11*
2000	51.578	5096	4.15	3.34

* in 1992

In the year 2000 12.886 cows of Brown breed (4976 kg of milk), 24.281 cows of Simmental breed (4 403 kg of milk) and 13.318 cows of Black and White breed (6 478 kg of milk) were included in the control.

After our experience dairy farming in Slovenia has improved on the basis of increasing use of

imported feedstuffs. The proposed nutrition management program (Orešnik, 1996) is not yet accepted by all farmers or adviser services. On an average dairy farm the efficiency of utilisation of ingested energy is as a rule below 70% (Orešnik, 1997). We have presented the efficiency of the program on different model farms. Parallel to higher milk yield and higher roughage milk yield, fertility of cows and herd health have been improved (Orešnik, 1993, 1994 b).

Testing and adaptations of the program take course continuously. In the winter period 2001 (January - April) after one year of running the program on three larger farms (Black and White breed) we produced on average 11.92 kg of milk per cow and day from roughage. A calculation for the whole year gives the amount of 4 350 kg of milk from roughage per cow. In the quality of grass silage and hay there exist for the winter period a great part of reserves (Table 2).

Table 2. Milk yield and concentrate use on controlled farms

Tablica 2. Proizvodnja mlijeka i korištenje koncentrata na kontroliranim farmama

Farm	No. of cows Broj krava	Average milk yield, kg/day Pros. proizvod. mlijeka kg/dan	Concentrate per kg milk kg Koncentrat po kg mlijeka	Milk from roughage, kg/day Mlijeko od grubog krmiva
A	214	21.18	0.23	11.43
B	187	19.52	0.21	11.32
C	169	20.89	0.20	12.53
Total/Average Ukupno/prosjek	570	20.55	0.21	11.92

In May (incomplete results) in cows on pasture milk yield was higher (21.5 kg) and concentrate use lower (0.170 kg). The calculation gives 5180 kg of milk per cow and year from roughage. We expect to produce more than 5000 kg of milk from roughage and in total more than 70% of milk per cow from roughage.

Investigations and direct professional work on model farms and the results obtained on the best farms in Slovenia show clearly that with proper nutrition management on an average Slovenian dairy farm it is possible to increase net income by 30% (Orešnik, 2000).

DISCUSSION

Dairy cows are of interest to researchers because of their relatively high metabolic demands for nutrients. They also represent a considerable proportion of the total feed production. The new vision of dairy cows' requirements needs classification in terms of the economics of feeding. Nutrition is in a stage of transition from calculation of requirements to prediction of responses. The predicted animal performance should be that which is both biologically and economically relevant and the term "nutrient allowances" is introduced (Oldham, 1996).

It is encouraging that more attention is being directed towards determination of the rate of degradation of nutrients within the rumen, particularly to improve energy and protein synchronisation for microbial metabolism. Possibilities for extension of protein evaluation to amino acid systems are considered (Rulquin and Verite, 1996, NRC, 2001).

Requirements for neutral detergent fiber (NDF) and acid detergent fiber (ADF) are discussed with special attention. In the mineral and vitamin supply a new approach - bioavailability - is taken into the consideration (NRC, 2001, Ball, 1998). Ultra trace elements (n=15) and their functions in metabolism are studied (Underwood and Sutton, 1999).

DCAD (dietary cation-anion difference) is getting more and more applicable (Brand et al., 1997). New concept in B-vitamin sources, bioavailability and microbial production promise a revolutionary alteration in the way of thinking and in dairy cattle feeding (Flachowsky, 1999). It is becoming increasingly important that to consider the impact of animal systems and feeding on the environment. Unfortunately, calf and heifer management is often overlooked in the dairy enterprise. Seasonal influences on milk yield and milk composition have to be prevented by adaption of feeding concerning different environmental conditions. Dairy cattle nutrition can also be regulated also by new

techniques in animal production and in feed manufacture.

All these new developments and knowledge have to be constantly involved to a new profitable strategy in dairy cattle nutrition.

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SAŽETAK

Proizvodnja mlijeka u Europi kao i u Sloveniji ulazi u razdoblje ekonomskog i političkog pritiska, što će dovesti do novog poleta za djelotvornost u proizvodnji mlijeka na farmi. Intenzivna proizvodnja mlijeka i ovisnost o uvezenom krmivu više nije u prvom planu nove strategije razvoja stočarstva. Nova strategija traži mnogo veće oslanjanje na vlastite snage, što pretpostavlja niži prinos mlijeka po kravi i novi pristup u hranidbi mliječnog goveda. Nova strategija u hranidbi mliječnog goveda temelji se na novoj definiciji mliječne krave visoke proizvodnje te u skladu s aktualnim

mliječnim kvotama i nižim cijenama mlijeka to više nije krava visoke proizvodnje mlijeka nego krava koja može proizvesti veću dobit. U proizvodnji mlijeka pozornost treba isto tako usmjeriti na sveopće probleme seoskog razvoja, očuvanja okoliša, dobrobiti životinja i zdravlja ljudi. Cilj ovog članka je dati pregled principa, upravljanja programom hranidbe, uvedenog i razvijenog u Sloveniji, koji se rukovodi probitačnošću proizvodnje mlijeka, što se temelji na obrocima bogatijim grubom krmom te je vezan uz upravljanje plodnošću i zdravljem stada.

Istraživanja i izravan stručni rad na uzornim farmama i rezultati postignuti na najboljim farmama jasno pokazuju da je uz ispravno upravljanje na prosječnoj slovenskoj mljekarskoj farmi moguće povećati neto prihod za trideset posto.

Ključne riječi: mliječno govedo, hranidba, upravljanje, gospodarstvo



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K U Š K O V I T

Vitaminsko, mikro- i makro- mineralna predmješavina za pojedine vrste i kategorije životinja s učešćem u gotovoj krmnoj smjesi u količini od 5%, i iznimno za nesilice u količini od 10%. To je proizvod kojim se zadovoljavaju potrebe životinja u svim nezamjenjivim hranjivim tvarima potrebnih organizmu za pravilan rast, razvoj, proizvodnju te povećanje otpornosti.

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