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Review articles

SYSTEMS OF CATTLE HOUSING

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Abstract: In intensive milk production particular attention is given to genetic improvement of cattle for high milk production and high quality of milk. Such trend should be followed by improvement of non genetic factors through technology and management. This is related to up to date solutions for high milk production, better cow reproduction, increase of productivity, better working conditions, better housing, efficient health protection and hygienic conditions, better technology of cow feeding, etc.

It is known that two systems of cattle housing are present: free stalls and station barn with a number of modifications, among which the frequently mentioned one is semi-free stall as a combination of the two basic ones. Some variations within two systems are due to farm, climate and other differences. Based on a number of investigations, it is found that station barns have some advantage when milk yield is considered, while free stalls have preference when the reproduction of cows, productivity of labor, health protection and longevity of cows are considered.

Key words: cow, freestall, station barns system, milk yield, cow reproduction.

Introduction

New findings and atempts in improvement and modernization of cattle production, particularly in milk production are directed to intensive utilization of genetic potentiality of cows by up to date equipment, increase in labor productivity, better working conditions, housing, etc. Today, it is known that non-genetic factors cause major part of variation of quantitative traits in cattle. One of

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such factors is the system of housing (Milic et al., 1994a, 1994b, Schubert and Ernst 1979, Radica Djedović et al., 2002). In practice, there are two systems of cow housing: free stalls and station barns, with a number of modifications. A frequently mentioned one is a semifree stall. In station barns system cows could be fixed only in winter, and in summer only during milking, while the rest of time they are on pasture or in corrals. On some farms cows are partly tied up and partly free. One of the main goals of housing is to achieve high milk production with efficient use of equipment and labor (Magoč et al., 1993).

In relation to complexity of different systems of cow housing, it is necessary to analyse and evaluate their advantages and weaknesses in use on state and private farms.

Station barn systems

Station barn system of cow housing is traditional in many countries. In some countries it is used up to 90%. On the farms with 50-100cows this system is gradually being substituted with free stalls.

Station barn is characterized by the fixation of cow on a particular place in the barn. At that place cow is fed and milked with an individual treatment. Cow is protected at that place what with appropriate treatment provides optimal conditions for full expression of genetic potential of each animal. On large farms cow is moved at the end of location to a group of dried cows. But, on smaller farms cow calves, and is milked, inseminated and kept dry at the some place, which is not a good semi-free stall system of cow housing.

Semifree system of housing

Semifree stall system of cow housing is a modified station barn system with some improvements. When cows are dried up, they are kept free in a group. There are different ways of cow keeping during lactation. The frequent one is with loosed cows in a part of day, after feeding and milking. Cows have access to open corrals. Better are corrals with shelter against bad weather. It is important for cows to have opportunity for walk with good effects on health, appetite, reproduction and longevity.

With semi free system of cow housing the problem could be disturbance in "social status" of animals when the group of cows is large.

Free stalls system of cow housing

Free stalls system is basically a group housing of cows. The attention is given to a group or to group average. The group of cows should be uniformed with age and production of milk. On large farms the physiological stage of cows should be

considered when groups are formed. Cows for insemination in the first 100-120 days of lactation could be easily observed if they are in a group. This is also important for feeding (Trifunović, 1992).

With the aim to accomplish good results in free stalls system, the size of a group of cows and the number of animals per unit of surface are important. If concentration is too high, the cows are more disturbed (kicking, poking etc.) with bad effects on health and milk production (Kondo et al., 1989, Czako, 1983). To date the biggest size of a group is not known, but it is usual that 50-60 cows on large farms could be one group. With the moving of the cows from one to an other group, which is rather frequent, the "social status" is disturbed, thus causing less restings and increased nervous behavior and reduction in milk production (Botto and Zimmermann, 1986). If there is bigger number of cow groups, based on physiological stage and level of milk production, efficiency is increased but the management is complicated. The number of cow groups is also dependent on feeding regime and the capacity of milking parlour, etc.

In free stalls system of cow housing two kinds of resting area could be the lige boxes and deep bedding. The feeding, milking, and cleaning could be done in a similar way in both subsystems. The cows on deep bedding with straw have no individual places for resting and are easily disturbed, and the keeping of the dry bed is difficult and dependent on large quality of straw (10-15 kg/day/caw). The deep bed is moved by mechanics 3-4 times per year. The deep bedding is not widely used, but rather in case of surplus of straw.

Free stalls system of cow housing is substantially improved by the use of "lige boxes" and the so called fres lige boxes. In free lige boxes a cow could be fixed, so this may combine advantages of free stalls and station barn systems, particularly in individual feeding and care.

Free stalls with lige boxes are very favourably accepted by the farmers, so they are spreading in practice. The good characteristic of free stalls is that each cow has a comfortable and protected bed with little straw (Lazarevic et al., 2000).

In free stalls corridors could be made by solid concrete and by grated concrete under which is channel for liquid manure. Solid concrete allows the use of straw for bedding, which protects animals from injuries. Cows kept in free stall housing are subject to increased disease of hoofs and lameness compared to cows in station barns (Coenn, 1980, Mamaton,1987).

Basic advantages and disadvantages of free stalls and station barns systems of cattle housing

In recent years there hes beeu permanent work on finding out better and rational technical and technological solutions within the existing systems for dairy cow housing.

Station barns for cows is a traditional way dominating in Europe where high milk production was the goal. Today, this system is regarded as retrograde and is in the stage to be abandoned. Contrary to that, this system has some good attributes. One of them is that each cow could be individually observed, treated and well cared for. The animal is well protected from other undesirable effects and from other aggressive animals. Individual feeding is easily applied according to the production. Veterinary observations, diagnosis and treatments are facilitated. Handling of animals when are moved could be easy. These attributes of station barns contribute to high milk production (Schmbert and Ernst 1979, Milić et al., 1994b).

The station barns have weak attributes whose effects come out in different ways. The use of labor and techniques is higher per unit of production (Bickert and Light, 1982, Čobić et al., 1985, Palmer, 1981). The transportation of food, straw, milk and manure is increased. If the open parlours are used, labor is used to free and tie the cows. The investment in building is higher because of better isolation of cows and workers (milkers). The milking of cows in the barn and abandon of cow walking are weak points.

The advantages of free stalls system of dairy cow housing are gaining in importance recently because of their convenience for cows with high genetic potential. Such cows have bigger value and they are expected to stay in 5 and even more lactations and more in production. Less labor efforts are demanded in working operations (Magoč, 1993). So, the working conditions are improved. The use of milking parlor improves both the hygienic and the working conditions. The concentrate food could be distributed individually in milking parlour. By computerized techniques milk production is recorded, and many physiological, health and other checks could be done. Under better conditions animals are healthy, clean and the longevity is increased. It is very important that fertility of cows is better. Parameters of fertility are given in table 1. The service period after third calving was longer in station barns by 60 days, and the period between third and fourth calving by 58 days. Vučetić et al., (1983) and Čobić et al., (1985) have estimated that calving percent of cows is better in free stalls by 8.29% and 8.82%, respectively. Higher percent of culled cows (18.7%) was in station barns, while in free stalls was 14.1% (Schubert and Ernst, 1979). The some others found the cow sterility to be 23.9% and 19.7%, respectively.

In the so far analysed results for milk yield and milk fat content, it is stated that big differences are still present. Good explanations for such diifferences could not be given (Trifunović et al., 1995). The same autors found that free stalls are based on new and rational buildings. Trifunović et. al., (1995) pointed out that free system is superior to the system with breeding in the station barns.

The same autors also stressed that free system of breeding is based on new and rational buildings. In these conditions, it is possible to use high technology first having in mind mechanization and automatization of working proceses. Also, high genetic base of dairy cattle has to be developed and as much as possible used.

T a b. 1. - Fertility of cows in two systems of housing (Milić at al. 1994, 1995)

	Servis period, days			Period between calving, days		
Calving	St. barn	Free stalls	Differ.	St. barn	Free stall	Differ.
1	2	3	4	5	6	7
I - II	175	141	-34	451	418	-33
II - III	172	147	-25	450	426	-24
III - IV	187	127	-60	460	408	-58
IV - V	166	143	-23	442	422	-20

Trifunović et. al., (1994) also recommended free system of housing in conditions of small farms with the capacities of 30 milking individuals.

There are disadvantages in free stalls system of dairy cow housing, such as: group keeping and treatment of cows, easier disease spread, leg injuries, etc.

Conclusion

Based of the available investigations of station barns and free stalls system of dairy cow housing it can be concluded that insuficient data available did not bring complete answer on alla questions. The investigations were done under farm conditiions with different genetic potential of animals, with differences in technology, equipment, working discipline, way of feeding, age of cows etc. The milk yields were with large differences, which are not only due to system of cow housing. So, they are not well explained. The number of factors influences the decidion on cow housing.

In relation to egsisting tendency of increasing number of cows per dairy farm and specialization in production it could be expeced thal free stalls with up to date milking parlours will be prefered, and that the future of dairy peroduction will be with this ssystem of cow housing.

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SISTEMI DRŽANJA GOVEDA

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Rezime

Prema postojećim saznanjima o vezanom (tradicionalnom) i slobodnom (savremenom) sistemu držanja ne raspolaže se u dovoljnoj meri sa rezultatima na osnovu kojih bi se dobio potpuniji odgovor na određeni broj pitanja vezanih za ovu problematiku. Ovakva istraživanja karakteriše nemogućnost ujednačavanja genetskog potencijala grla, nedovoljno usaglašavanje metodologija rada, kao ni stepen primenjene tehnologije, različit nivo radne discipline, starosna struktura zapata, način ishrane i slično. Analiziranjem rezultata o prinosu mleka uočavaju se velike razlike, gde upravo iz navedenih razloga se ne mogu u potpunosti dati valjana objašnjenja. Upravo zbog toga, do sada postignute rezultate ne možemo na određeni način smatrati konačnim. Koji će se od navedena dva osnovna sisitema držanja krava u konkretnim uslovima primeniti, zavisi od niza okolnosti, kao i od visine ulaganja sredstava.

S obzirom na ispoljenu tendenciju povećanja broja grla u stadu i specijalizacije prizvodnje, za očekivati je da će se broj farmi sa slobodnim kretanjem krava i mužom u izmuzištu povećati, odnosno da je budućnost u govedarskoj proizvodnji na strani slobodnog sistema držanja.

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