

DISINFECTION – AN INTEGRAL PART OF FARM ANIMAL BIOSECURITY

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Summary

Farm animal biosecurity represents management practice to reduce risk by ensuring the absolute health of livestock. Simultaneously protect the financial investment and increase profitability and high final product quality. The aim of our work was the assessment the main way of complex preventive provisions to minimise the potential disease-causing microorganisms on to the farm and the evaluation the economical effect of stable disinfection.

Key words: biosecurity, animal health, microorganisms

Introduction

Farm animal biosecurity represents a complex of preventive arrangement to reduce risk by ensuring the absolute health of livestock (9). Therapeutic arrangement is in comparison very expensive. Using good breeding practices create the premises to prevent the herd from health disorders. Biosecurity is an integral part of health herd management.

Preventive measures in farm animal husbandry are directed to prevent the inception of diseases from outside and to reduce the microflora inside the farm – that is the prevention of microbial tiredness of stable, which is important for all farms with high number of animals or in stables with high population density. This may cause the growth depression and health problems in farm animals. Therefore the sanitary control measures should be incorporated in all stables, so that a good hygienic standard can be easily maintained. Good

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management can do much to reduce the effect of adverse environmental factors. The whole space of stable should be cleaned and disinfected periodically, in continuous system of breeding twice a year.

Optimum environmental conditions are necessary if animals are to reach genetic potential. The direct costs of suboptimal environments are large when the cost related to health, eventually casualties and the failure to obtain maximum milk production considered for dairy cattle (1, 3, 7). On the opposite site, decreased dry matter intake and loss of milk production, depression of daily feed intake are most noticeable effects of heat stress. Clearly it can be demonstrated by Hauptmann et al. (6); Dolejš et al, (4); Brouček et al, (2).

Material and methods

The aim of our work was the assessment the disinfection, one of the main way of preventive provisions complex which aim to minimise the potential disease-causing microorganisms on to the farm and the evaluation of the economical effect of stable disinfection. We analyse the fattening bulls losses during all macroclimatic condition. (scaled in steps: 1-frosty winter, 2-moderate winter, 3-spring-autumn, 4-moderate summer, 5-hot summer).and express the level of selected microclimatic factors (air temperature, humidity and movement, carbon dioxide concentration, microbiological contamination and ventilation) in the stable for 180 fattening bulls. Next part of our work was direct to the monitoring of microbiological contamination of the stable air in the relation to the term of disinfection. Comparison of cost of preventive disinfection made by various disinfectants compared with potential economical losses in stable for 180 fattening bulls.

This model study was made in stable with deep litter housing of 180 head of fattening bulls from average weight form 180 kg to 550 kg with natural system of ventilation. Basic production parameters: fattening time 336 days, average daily increase 1,1 kg, average feed consumption per 1 kg of body mass increase- 2 (1,7-2,5) kg of concentrate feed and 23 (10-30) kg of bulk feed.

Physical factors of stable climate (air temperature, humidity and the air movement) were measured by common equipment (Therm -2286-2, Testotherm 452), the concentration of carbon dioxide and ammonium we assessed by Multiwarn II. Air samples for microbiological contamination of the stable air were collected by the sedimentation method on meat peptone agar, blood agar and with NaCl, Endo agar and Czapek-Dox agar and regularly examined using common microbiological methods. The results were evaluated by using the statistical method of non-parametrical tests.

Results and discussion

The results are summarised in the following tablets. The table 1,2 demonstrate the correlation between the outdoor and indoor climate in relation with the mortality and lowered body mass increase during the fattening period. Especially the period of sudden changes in the outdoor climate heavily influenced the ventilation of stables.

Table 1. - FATTENING BULLS LOSSES (FORM 180 TO 550 KG) DURING VARIOUS MACROCLIMATIC SITUATIONS

Macroclimatic conditions	1	2	3	4	5
Average total number of fattening bulls	180	177	163	171	174
Number of emergency slaughtering bulls	9	4	3	4	4
Number of casualties	2	1	0	0	1
Total losses	11	5	3	4	5
% of total count	6,1	2,8	1,8	2,3	2,9

Table2. - EVALUATION OF MICROCLIMATIC FACTORS IN STABLE FOR FATTENING BULLS (EXPRESSION OF TIME IN % SPEND IN OPTIMUM-TOLERANCE-STRESS CONDITIONS)

Classification	Thermal comfort					Carbon dioxide concentration					Microbiological air contamination					Evaluation of stable ventilation				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Macroclimate	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Optimum	0	0	25	30	20	85	55	50	35	25	0	5	25	25	20	0	5	30	30	70
Tolerance	5	65	75	65	70	15	30	40	65	60	85	65	65	70	70	70	70	65	60	30
Stress	95	35	0	5	10	0	15	10	0	15	15	35	20	5	10	30	25	5	10	0

The thermal environment has a strong influence of farm animals with air temperature having the primary effect, but altered by air movement, humidity and radiation (11). Too rapid a rate of heat loss leads to hypothermia and too slow heat loss lets to hyperthermia.

Microbial contamination of environment in stables develops to an important factor affecting the picture of infections in breeds. Animal health status depends on the capability of the animals to resist the infection pressure of micro-organisms in the environment (10). A high concentration of animals concomitant with the currently employed industrial large-scale breeding programmes results in an increasing microbial contamination of the housing environment, the quality and quantity of which is further influenced by the used technology and the type of animal housing (5).

From the microbiological point of view (table 3) stable disinfection represents the basic preventive precaution decreasing the count of stable microflora. During 150 res. 240 days after disinfection the number of observed microorganisms in the stable air come back to the initial level.

Table 3. - DYNAMICS OF NUMBER OF MICROORGANISMS IN THE AIR BEFORE AND AFTER DISINFECTION IN STABLE FOR FATTENING BULLS (NUMBER OF MICROORGANISMS IN 1 m³ OF THE AIR)

Operation period	Time period (days)	Groups of microorganisms (median)			
		Total count	Coliforms	H+micrococci	Moulds
Before disinfection	-14	1,3.e5	1,1.e2	2,3.e3	1,1.e4
		Disinfection			
	1	0	0	0	0
	30	9.4e3	1.0e1	9.0e1	1,2e3
After disinfection	60	2.3e4	4.1e1	4.5e2	3.9e3
	120	3.6.e4	9.3e1	1.8e3	3.7e4
	150	4.6e4	1.3e2	2.9e3	4.6e4
	240	1.8e5	1.2e2	3.0e3	1.7e5

According the results concerning the economical evaluation of stable (table 4, 5), disinfection in stable for fattening bulls cost from 3 160 CZK to 11620 CZK. But expected economical losses caused by various factors (see table 5) are 103 928,9 CZK. That means, that the price for stable disinfection (see table 4) represents only 3-11,2 % of total loses caused by decrease of improvement, and by depression of feed conversion. The correlation between the economic effect of poor management and housing condition are presented by Platz et al (8).

Table 4. - THE PRICES OF SELECTED DISINFECTANTS AND THE PREVENTIVE DISINFECTION OF STABLE FOR 180 FATTENING BULLS. (FROM 180 TO 550 KG)

Type of Disinfectants	Using concentration (%)	Price per (in CZK)			
		1 kg disinfectants	1m ² of disinfected surface	whole stable 4000m ²	1 animal
Chloramin B	2	79,00	0,790	3160	17,55
Desam GK	2	94,00	0,940	3760	20,89
Virkon	1	581,00	2,905	11620	64,55

Table 5. - PROBABLE LOSSES IN STABLE WITHOUT DISINFECTION (CALCULATED FOR 180 FATTENING BULLS)

Decrease of improvement - 0.04 kg		
Daily loss	7,2 kg	252,0 CZK
Total losses	2419,2 kg	84672,0 CZK
Depression of feed conversion - concentrate feed		
	0,02 kg	
- bulk feed		
	0,20 kg	
Daily loss		
Concentrate feed	3,6 kg	10,8 CZK
Bulk feed	36,0 kg	44,3 CZK
Total losses		
Concentrate feed	1209,6 kg	3628,8 CZK
Bulk feed	12096,0 kg	14878,1 CZK
Decrease of emergency slaughter bulls by 1 head (45 kg)		
(lower realisation price)		750,0 CZK
Total of expected economical losses		103 928,9 CZK

Conclusion

In our model we proved that good environmental condition for farm animals in stables depends not only on barns management, as well as on the sanitary care. From our results it follows maintenance of adequate hygienic level ensures high level of production and reproduction parameters of the farm animals and the economical profit for the stockman.

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DEZINFEKCIJA – OSNOVA BIOSIGURNOSTI ŽIVOTINJA NA FARMAMA

Sažetak

Biosigurnost životinja na farmama predstavlja cijeli menagment da bi se smanjio rizik ugrožavanja zdravlja životinja na farmama, štiteći na taj način financijsko ulaganje i profitabilnost farmera te visokokvalitetnu proizvodnju. Cilj rada bio je određivanje preventivne provizije da bi se minimalizirale potencijalne bolesti uzrokovane mikroorganizmima na farmama i vrednovanjem ekonomskog efekta na dezinfekciju štala.

Ključne riječi: biosigurnost, zdravlje životinja, mikroorganizmi

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