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CONTENT PROCEEDINGS

Plenary Lectures

1. Brka M., Brka E.: **INTRODUCING INTERNET OF THINGS IN AGRICULTURE IN OUR REGION: POSSIBILITIES AND CHALLENGES**13
2. Duplecz K., Husvéth F., Wágner L., Márton A., Koltay I., Such N., Rawash, M.A., Mezőlaki Á., Pál L., Molnár A.: **FEEDING LOW PROTEIN POULTRY AND PIG DIETS - PHYSIOLOGICAL, ECONOMIC AND ENVIRONMENTAL ASPECTS**20
3. Zorc M., Ogorevc J., Dovč P.: **ANIMAL SCIENCE: A GENOMIC PROSPECTIVE**30

I Section: Animal Production, Reproduction and Genetics

4. Gantner, V., Gavran, M., Dokić, D., Gantner, R., Bunevski, Gj., Gregić, M., Bobić, T.: **THE VARIABILITY IN PERSISTENCY OF HEAT STRESS EFFECT IN DAIRY CATTLE DUE TO BREED AND BREEDING REGION**34
5. Gregić M., Baban M., Bobić T., Dokić D., Gantner V.: **THE DIFFERENCES IN TEMPERATURE OF HORSE CORNEA AND RUMP MEASURED BY THERMOGRAPHIC CAMERA DUE TO HORSE TYPE**40
6. Karşlı T., Balçioğlu M.S.: **GENETIC CHARACTERIZATION OF HONAMLI GOAT BREED BASED ON MICROSATELLITE LOCI**44
7. Petrović M.D., Rakonjac S., Bogosavljević-Bošković S., Đoković R., Petrović M.Ž., Bogdanović V., Đedović R.: **EFFECT OF FARMING REGION AND CALVING SEASON ON COMPLETE-LACTATION PRODUCTION TRAITS IN SIMMENTAL COWS**51
8. Rakonjac S., Bogosavljević-Bošković S., Škrbić Z., Lukić M., Dosković V., Petričević V., Petrović M.D.: **THE EFFECT OF THE REARING SYSTEM AND THE GENOTYPE OF LAYING HENS ON THE EGG SHELL QUALITY AT DIFFERENT PHASES OF THE LAYING PERIOD**58
9. Svoradová A., Vašíček J., Baláži A., Makarevich A., Tomková M., Čurlej J., Chrenek P.: **FLUORESCENCE DYES ON THE ASSESSMENT OF RAM SEMEN CHARACTERISTICS: STATE OF THE ART**65
10. Makarevich A.V., Olexiková L., Bedeová L., Kubovičová E.: **DEVELOPMENT OF BOVINE IN VITRO PRODUCED EMBRYOS DERIVED FROM CRYOPRESERVED OOCYTES**69

11. Bunevski Gj., Trivunović S., Štrbac Lj., Janković D., Janzeković M., Mergedus A., Gantner V., Plavšić M., Nikitović J., Klincarov A.: **EFFECTIVE SIZE ESTIMATION OF AUTOCHTHONOUS CATTLE BREEDS**75
12. Cekić B., Ružić-Muslić D., Maksimović N., Caro Petrović V., Bijelić Z., Ćosić I.: **PRODUCTIVITY OF LIPA SHEEP IN CENTRAL SERBIA**.....81
13. Spiridonović S., Šaran M., Janković D., Štrbac Lj., Dragin S., Trivunović S.: **REPRODUCTIVE PROBLEMS AFFECTING THE CULLING OF DAIRY COWS IN AP VOJVODINA**88
14. Mekić, C., Perišić, P., Ćosić, M.: **HEMOGLOBINE GENOTYPES AND THEIR CORRELATION TO IL D' FRANCE SHEEP BREED BODY WEIGHT**94
15. Đokić M., Marković B., Marković M., Mirecki S., Veljić M. : **RELATIONSHIP BETWEEN β -LACTOGLOBULIN GENE POLYMORPHISM AND MILK TRAITS AND MILK COMPOSITION OF SORA SHEEP BREED** 100
16. Mirkov M., Radović I., Polovinski – Horvatović M.: **OPTIMIZING THE PARITY STRUCTURE IN SWINE PRODUCTION AT YORKSHIRE GENOTYPE**106
17. Zvekić D., Božić A., Jurakić Ž.: **THE INFLUENCE OF THE SEASON ON THE QUALITY OF SEMEN AND POSTINSEMINATIONAL ESTRUS REACTION IN SOWS**..... 112
18. Žarković I., Pihler I., Zarubica B., Jurakić Ž., Čobanović K., Bjedov S., Belić N.: **THE INFLUENCE OF THE SEASON ON PARAMETERS OF LACTATION IN THE SAANEN BREED OF GOAT** 118

II Section: Animal Health, Welfare and Farm Biosecurity

19. Belić B., Cincović M.R., Lakić I.: **REFERENT VALUES OF HEMATOLOGIC PARAMETERS IN HEIFERS** 125
20. Božić A., Anderson R., Crippen T., Hume M., Beier R., He H., Genovese K., Poole T., Nisbet D.: **INHIBITION OF SALMONELLA BINDING TO PORCINE INTESTINAL CELLS BY A WOOD-DERIVED PREBIOTIC** 131
21. Ostojić Andrić D., Hristov S., Petrović M.M., Pantelić V., Nikšić D., Petrović Caro V., Petričević M.: **ASSESSMENT OF DAIRY COWS' HEALTH PARAMETERS IN RELATION TO WELFARE QUALITY AND REARING SEASON** 133
22. Pavlović I., Ivanović S.: **GASTROINTESTINAL HELMINTHS OF GOATS BREED IN CENTRAL PART OF SERBIA** 143
23. Petrujkić B., Božić A., Anderson R., Crippen T., Hume M., Beier R., He H., Genovese K., Poole T., Nisbet D.: **FERMENTABILITY OF A WOOD-DERIVED PREBIOTIC BY RUMEN AND FECAL BACTERIA** 149

24. Onbaşılar E. E.: **CORRELATIONS AMONG EMBRYO WEIGHT AND VILLUS CHARACTERISTICS IN THE SMALL INTESTINE OF WHITE LAYER EMBRYO AT DIFFERENT EMBRYONIC AGES** 155
25. Onbaşılar E. E.: **CORRELATIONS BETWEEN MINERAL LEVELS IN THE EGG SHELL WITH PROPERTIES OF THE TIBIA IN THE EMBRYOS OF DIFFERENT LAYER GENOTYPES** 160
26. Yalçın S., Onbaşılar E. E.: **USAGE OF CLAY AND CLAY LIKE MINERALS AS LITTER MATERIAL IN BROILER PRODUCTION** 164
27. Gržin S., Jugović M., Lučar V., Bojić N., Pavlović M., Dimitrijević V., Petrujkić B.: **THE EFFECTS OF BIOCHAR ADDED IN THE FEED ON CERTAIN BLOOD AND PRODUCTION PARAMETERS OF CALVES** 168
28. Relić R., Đermanović V., Perišić P.: **DIFFERENT VIEWS ON ANIMAL WELFARE: HAS SOMETHING CHANGED?** 175

III Section: Animal Nutrition and Feed Production

29. Đorđević N., Grubić, G., Stojanović B., Božičković A., Blagojević M.: **THE INFLUENCE OF DEVELOPMENT PHASE, RATIO AND ENSILING OF VETCH AND OATS ON DIGESTIBILITY** 182
30. Petričević V., Lukić M., Škrbić Z., Petričević M., Dosković V., Rakonjac S., Cekić B.: **THE EFFECT OF GARLIC ON THE QUALITY TRAITS OF BROILER CARCASS** 188
31. Krstović S., Guljaš D., Beuković D., Ivković M., Jajić I.: **MONITORING OF AFLATOXIN IN SERBIAN MAIZE DURING 2017 AND 2018 HARVEST SEASONS** 192
32. Yalçın S.: **EFFECTS OF SEPIOLITE USAGE IN LAMB GROWER CONCENTRATE FEED ON PELLET PRODUCTION PARAMETERS AND PELLET QUALITY CHARACTERISTICS** 198

IV Section: Game Production, Fishery and Beekeeping

33. Đorđević N., Popović Z., Beuković D., Beuković M., Vukadinović, M.: **IMPACT OF HUNTING GROUND, NUTRITION AND CHEMICAL FACTORS TO MORTALITY, REPRODUCTION AND USE VALUE OF PHEASANT MEAT (*Phasianus colchicus*)**..... 204
34. Gavran M., Gregić M., Gantner V.: **THE VARIABILITY IN ROE DEER POPULATION IN HUNTING AREA IN EASTERN CROATIA IN THE PERIOD YEAR 2008 – 2018** 210

35. Urosević I.M., Esattore B., Saggiomo L., Stojanac N., Beuković D.: **ANIMAL WELFARE STANDARDS IN FALLOW DEER (*Dama dama*) FARMING: REGULATORY COMPLIANCE IN EUROPEAN UNION AND SERBIA**216
36. Beuković D., Beuković M., Popović Z.: **PESTICIDE RESIDUES IN THE FAT TISSUE OF BROWN HARE (*Lepus europaeus*) AFTER AUTUMN HARVESTING IN HUNTING GROUNDS , OF THE BANAT AREA, SERBIA**223
37. Beuković D., Beuković M., Popović Z., Vukadinović M., Božić A., Đorđević N., Jajić I., Glamočić D., Krstović S.: **ACCUMULATION OF LEAD AND CADMIUM IN THE LIVER OF BROWN HARE, (*Lepus europaeus*) IN ONE HUNTING GROUND , WITH INTENSIVE CROP FARMING IN THE SOUTHERN PART OF THE PROVINCE OF VOJVODINA**.....229
38. Nedić N., Bursać S., Zlatković B.: **CONTENT OF MOISTURE, WATER ACTIVITY, pH AND ELECTRICAL CONDUCTIVITY AS INDICATOR OF HONEY QUALITY FROM COMMERCIAL STORES AND PRIMARY PRODUCERS**235

V Section: Organic and Alternative Livestock Production

39. Čobanović, K., Krstović, S., Štrbac, Lj., Šaran, M., Kučević, D.: **INFLUENCE OF MILK UREA ON OPEN DAYS PERIOD IN CONVENTIONAL AND ORGANIC MILK PRODUCTION**242

VI Section: Quality of Animal Products

40. Ivanković A., Pećina M. Šubara G., Šuran E., Konjačić M., Kelava Ugarković N., Ramljak J.: **GROWTH AND CARCASS PERFORMANCE OF ISTRIAN BULLS**250
41. Polovinski Horvatović M., Radović I., Glamočić D., Jajić, I., Krstović S., Mirkov M. , Tomić M.: **OCCURENCE OF THE OCHRATOXIN A IN THE KIDNEY OF THE SLAUGHTERED PIGS IN THE REGION OF VOJVODINA, SERBIA**256
42. Ledina T., Djordjević J., Bulajić S.: **ANTIBIOTIC RESISTANCE IN LEUCONOSTOC ISOLATES OF CHEESE ORIGIN**261
43. Miocinović J., Miloradović Z., Pudja P.: **GOAT MILK PROCESSING: TECHNOLOGICAL CHALLENGES**267
44. Yalçın S., Yalçın S.: **EFFECTS OF YEAST CELL WALL ON EGG QUALITY CHARACTERISTICS IN LAYING HENS**274
45. Yalçın S., Eser H., Yalçın S., Onbaşlılar İ.: **EFFECTS OF THE MIXTURE OF ESSENTIAL OILS AND ORGANIC ACIDS ON BROILER PERFORMANCE AND MEAT QUALITY**279

ASSESSMENT OF DAIRY COWS' HEALTH PARAMETERS IN RELATION TO WELFARE QUALITY AND REARING SEASON

Ostojić Andrić D.¹, Hristov S.², Petrović M.M.¹, Pantelić V.¹,
Nikšić D.¹, Petrović Caro V.¹, Petričević M.¹

Abstract: Due to actual global concerns for farm animal welfare and an also prominent issue of climate change effect, this study was conducted in order to examine the expression of dairy cows' health parameters in two main seasons (winter and summer). Thirteen health parameters classified into two main groups, injuries and diseases, were selected and analysed according to their relevance for welfare provision by Welfare Quality® Assessment Protocol for Dairy Cows (2009). According to the final calculation score (0-100 points) parameters were descriptively categorized as unacceptable, acceptable, enhanced or excellent in terms of welfare provision. Data were collected through clinical scoring and veterinary reports available on a total of 16 dairy farms (N=4.833 cows). The temperature ranges for winter and summer season in a given year were -4.2 to 7.2°C and 19.3 to 27.4 °C respectively. Obtained welfare scores for injuries (41/100 points) and diseases (59/100 points) showed that cows in both seasons were more prone to injuries than to diseases. Estimated welfare condition for injuries was categorized as acceptable, and for diseases as enhanced, indicating no severe risk for welfare was determined. No significant differences for examined parameters were found between seasons with exception of somewhat higher lameness frequency in the winter season (39% vs. 32%). Frequencies of diseases were, in majority below alarm thresholds except for mastitis (2.6%) and conjunctivitis (6.0%) in the summer season.

Keywords: dairy cows, diseases, injuries, welfare, season

Introduction

Health and welfare are inseparable concepts, as good health is a prerequisite for the welfare and vice versa. However, if the welfare is viewed as a broader concept, health can be seen as an indicator of its quality. Incidence of respiratory and reproductive disease, as well as locomotive, digestive and metabolic disorders, and the mortality can be used as the

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so-called, animal-based indicators of the welfare of cows in a herd (Canali et al., 2009). They essentially manifest response of the animal on provided conditions i.e. indicate the level of satisfaction of their needs which is the most important issue in assuring animal welfare. Animals in the absence of resources to meet their basic needs are becoming more prone to numerous welfare risks. EFSA (2009) highlighted four key risks to the welfare of dairy cows: housing, feeding, management and genetic selection. The etiology of many diseases is multifactorial and depends largely on the conditions in which animals are grown, which is why the cows must be provided an environment that reduces the occurrence of stress and weakening of immunity (SCAHAW, 2001). The effective care for the health of cows, therefore, requires the provision of adequate rearing conditions and preventive action. Monitoring and analysis of welfare conditions on farms are important prerequisites for welfare quality improvement. As part of the consideration of the welfare conditions on dairy farms, one of the issues is to ensure the thermal comfort for cows. The fact is that cattle are easily acclimatized and transported in almost all regions of the world, providing they have adequate food, water and protection against excessive air currents, solar radiation and precipitation (Webster, 1983). It follows that they have an effective mechanism of reaction to heat stress, regulation of heat loss and the incentive of cold thermoregulation, i.e. cooling. On the other hand, some studies suggest that the issue of providing thermal comfort is certainly important because the incidence of heat stress negatively affects appetite and body condition (Silanikove, 1992), production (West, 2003), reproduction (Garcia-Ispierto et al., 2007), health (Shearer and Beede, 1990), i.e. the welfare of cows in the broader sense (Hristov et al., 2008). Since so far no reliable and at the same time simple indicators of thermal comfort have been defined, this study was primarily aimed at investigating the impact of the season as a complex factor (temperature, humidity, solar radiation, etc.) on the expression of health parameters selected on their relevance for welfare provision.

Material and Methods

The study was conducted on 16 selected Serbian commercial dairy farms (N=4833; Mean \pm SEM: 301 \pm 71.6 lactating cows). Thirteen health parameters classified into two main groups, injuries and diseases, were selected and analysed according to their relevance for welfare provision by Welfare Quality® Assessment Protocol for Dairy Cows (2009). Three trained assessors (experienced in cows' welfare assessment) evaluated the sampled cows on each farm. Processing of data was carried out using the Welfare Quality® scoring system software program. According to the final calculation score (0-100 points) parameters were descriptively categorized as unacceptable, acceptable, enhanced or excellent in terms of welfare provision. The statistical significance of the seasonal effect on welfare in the studied farms was determined by the t-test or the Mann-Whitney test, depending on the normal or abnormal distribution of the data, established with the Kolmogorov-Smirnov test. P values less than 0.05 were considered as significant.

Results and Discussion

Provision of conditions for the health of dairy cows in the winter and summer seasons was perceived/studied through the assessment of the criteria - absence of injury and absence of disease, taking into account the relevant indicators (Tables 1 and 2). The season did not show a statistically significant influence on any of the observed parameters, nor on the overall health condition of the cows, which in both seasons was assessed as acceptable, i.e. score of 40/100 points. Although this assessment indicates that cow welfare was not significantly affected, it also warns that only minimal requirements regarding their health have been met.

In terms of injuries, lameness represent one of the most important indicators of cows' health but also a leading health and economic problem in the dairy industry (Kossaibati and Esslemont, 1997). Besides the direct costs of treatment, lameness negatively affects milk production (Amory et al., 2008) and reproduction (Hernandez et al., 2001), and increases culling (Booth et al., 2004). Studies of lameness prevalence in dairy cattle in European countries show that it ranges from 22% (Whay et al., 2003) to 45% (Winckler and Brill, 2004) in free housing systems, and from 1% to 21% in housing systems where the cattle are periodically kept tied (Sogstad et al., 2005). According to findings of Webster (2005), lameness prevalence defined in our study for both seasons correspond to range from 31 to 50% that indicate endangered welfare. In accordance with the results of Rowlands et al. (1983), the incidence of laminitis (Table 1) was somewhat higher in winter than summer (38.6% vs. 32.3%), which can be related to poor conditions of cow comfort in the winter season (Ostojić Andrić et al., 2017) while increased humidity is also referred to as one of the cofactors (Sanders et al., 2009).

Table 1. Total score for injuries and frequencies of belonging parameters

Season	Winter					Summer					
Number of farms, N	N=16					N=16					
Average temperature range (C°)	-4.2 to 7.2					19.3 to 27.4					
Total score/ frequencies of parameters	\bar{x}	SD	S ²	Min	Max	\bar{x}	SD	S ²	Min	Max	F
Total score for injuries, points	50.16	15.58	242.87	21.00	81.10	52.98	14.44	208.39	21.90	81.10	ns
Not lame cows, %	61.42	18.53	343.47	20.60	90.00	67.70	16.58	274.98	34.00	88.60	ns
Lame cows, %	27.78	14.62	213.85	6.98	61.80	25.23	13.12	172.15	9.20	51.00	ns
Severely lame, %	9.93	6.84	46.78	0.50	20.30	11.97	20.40	416.12	0.00	86.55	ns
Cows with at least one part of skin without hair, no lesion, %	17.14	14.42	208.02	0.00	56.70	18.47	18.71	350.04	2.40	73.68	ns
Cows with at least one skin lesion, %	6.37	7.13	50.86	0.00	30.00	6.62	6.99	48.81	0.00	29.82	ns
Cows without skin lesion, %	92.66	8.88	78.82	70.00	100.00	87.69	22.61	511.43	6.90	100.00	ns

ns = p>0,05; * = p<0,05 ; ** = p<0,01

The score obtained for the criterion absence of disease (Table 2) was almost the same for both seasons, however, diseases such as mastitis, diarrhoea, and nasal and eye irritation were more common in summer season, and accelerated breathing and vaginal discharge in the winter season. Based on the recommendations of Forkman and Keeling (2009) on the frequency of these diseases from the aspect of welfare, it can be concluded that the health of dairy cows in both seasons is satisfactory and does not represent a welfare risk factor in the studied populations. The exception is the incidence of eye discharge in the summer season that exceeds the threshold of 6.0% and can be the consequence of an eye irritation due to increased ventilation of objects during warm summer months (Radostits et al., 1999). The frequency of mastitis in the summer months is also increased in relation to the winter period and slightly exceeds the 2.25% threshold stated by Forkman and Keeling (2009). Similarly was found in some other studies as a consequence of a greater resistance of microorganisms under given conditions and adaptive changes in the physiological status of cows that increase the disposition to inflammation (Webster, 1981).

Table 2. Total score for diseases and frequencies of belonging parameters

Season	Winter					Summer					
Number of farms, N	N=16					N=16					
Average temperature range (C°)	-4.2 to 7.2					19.3 to 27.4					
Total score/ frequencies of parameters	\bar{x}	SD	S ²	Min	Max	\bar{x}	SD	S ²	Min	Max	F
Total score for diseases, points	59.51	22.12	489.43	33.30	100.00	59.56	21.94	481.27	30.20	100.00	ns
Cows with nasal discharge, %	0.19	0.60	0.36	0.00	2.31	1.69	4.21	17.75	0.00	15.18	ns
Cows with hampered respiration, %	0.13	0.34	0.12	0.00	1.00	0.00	0.00	0.00	0.00	0.00	ns
Cows with ocular discharge, %	1.72	3.69	13.59	0.00	14.20	6.24	8.87	78.61	0.00	29.17	ns
Cows with diarrhoea, %	1.70	2.53	6.38	0.00	7.78	2.31	2.40	5.76	0.00	8.16	ns
Cows with vulvar discharge, %	1.73	1.83	3.34	0.00	5.55	1.16	1.10	1.21	0.00	3.20	ns
Frequency of coughing per cow per 15 min	0.06	0.25	0.06	0.00	1.00	0.13	0.34	0.12	0.00	1.00	ns
Frequency of mastitis, %	1.96	0.98	0.96	0.70	4.74	2.63	0.96	0.93	1.35	5.26	ns

ns = p>0,05; * = p<0,05 ; ** = p<0,01

Conclusion

Summarizing the results achieved in the assessment of the parameters of the health condition and the welfare of dairy cows, it can be concluded that, in given climatic conditions, they didn't exhibit significant variability under the influence of the season. The incidence of injuries and illnesses such as mastitis, diarrhoea, discharge from the eye and nose was higher in the summer season, while lameness, tachypnoea and vaginal discharge were more common in the winter season. Increased ventilation of objects during the summer months is often cited as the cause of conjunctivitis, with frequency exceeding the threshold from the welfare point of view. The more frequent incidence of mastitis during the summer months results from higher resistance to microorganisms in given conditions and adaptive changes in the physiological status of cows that increase the disposition to inflammation. On the other hand, a greater share of lame cows in the winter can be associated with poorer hygiene and comfort conditions during this time of the year.

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