Aspects of the Welfare of Dairy Cows in Farms with Tied- Stall Maintenance System and Action of the Upstream Factors. Part I

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Abstract

Researches were performed in 5 farms (F1, F2, F3, F4, F5) with a total of 20 dairy cows heads/ farm with similar growth conditions, system maintenance: tied-stall during cold season and grazing in spring-autumn season. Animal shelters are the undersized in terms of requirements related with necessary of fresh air, and the introduction of clean air. Air volumes calculated after carbon dioxide and humidity indicates deficiencies on removing harmful gases during winter [CO_2 : 0.4 ± 0.03 (F1)- 0.6 ± 0.02 (F2); NH_3 : 0.21 ± 0.3 (F1)- $0.26.8 \pm 0.04$ (F3)] and airflow produced by ventilation unorganized adopted [0.6 ± 0.22 (F1)- 0.92 ± 0.29 (F4)] increase the degree of discomfort to the animals. Comfort and welfare in terms of the surface resting expressed by cow comfort index (CCI) and Stall Standing Index (SSI), assessed by repeated observations varies between: CCI= 70% (F2) and 90% (F1, F4), SSI= 10 ± 8.52 (F5)- 30 ± 13.484 (F2) during winter depending on the degree of comfort provided by stand size. Between THI values obtained and these indicators notice differences extremely significant. Mobility and locomotion score/overall farms indicate values between 1.90 ± 0.49 (F5) and 2 ± 0.56 (F3) on grazing season but higher in the cold season, existing whole range of relationships: from insignificant to extremely significant.

Keywords: cow, comfort index, sheltering, welfare

INTRODUCTION

Recent research has shown that the tie-stall system maintenance is a factor with negative impact on animal welfare (Krawczel, 2013). Constraints and lack of freedom of movement are considered problems in relation with the five freedoms of animals (2 freedom for discomfort –2; Brambell, 1965).

The productive performance, longevity and dairy cows health is dependent on factors by: upstream; on the product, downstream of the product (Man, 2002). Farm management must take into account all aspects related to the animals welfare, firstly dependently sheltering which includes a number of factors: environmental conditions, fresh air (ventilation), manage extreme

temperature, resting and moving, providing clean and dry rest area, proper watering and feeding which represents major desideratum in the profit of a farm, and in the same time keeping a good general health of dairy cows and especially of mammary gland health and hoof (Blokhuys, 2009).

Maintaining an appropriate positive microclimate influence the health of animals and the externalization full potential productive (Novack *et al.*, 2005).

Poor ventilation leads to increased percentage of mastitis and respiratory disease (Bosse *et al.*, 2009). After Wathers (1992) in the winter season the value of airflow will not exceed 0.2 m/s and in the summer 0.6 m/s at the level of animals. Unfavorable direct action of air currents occur by altering health

status, whereas it removes the layer of warm air around the animal which are replaced with cold air, leading to installation of afrigore disease (El Mahdy, 2013).

The amount of ammonia depends on rate of ventilation, shelter construction and management applied at farm level. Concentrations right under the permissible limit but lingering have a negative influence on health status of dairy cows especially by increasing the rate of hoof disorders and mastitis incidence. Carbon dioxide (CO₂) resulted from of the animals' exhalation, degradation of organic matter by manure, plant debris. Stimulates respiration, sanguine function and delayed effect on milk production (Sabuncuoglu *et al.*, 2007).

The temperature in dairy cows shelters can values ranging from 0 and 20°C (Saubraus 1997), and for production has a range between 0 and 15°C (BVET, 2002).

The humidity in shelters results by the accumulation of physiological factors: animals' respiration, perspiration, excrete solid and liquid and all the technological process what involve water. Between 40 and 80% humidity shelters is considered appropriate. Negative effects occur under the values 40% and over 80% cumulated with the action of other microclimate factors, particularly temperature and air speed (Drăghici, 2001). THI indicates categories of heat stress under conditions high temperature. Range between 70 and 74 showing the existence of a potential heat stress among the animals (Hann, 2003).

Indicators for assessing comfort and welfare are tools available for farmer to identify and straighten some shortcomings.

Udder health problems can be caused by cubicle house, tie-stall, straw yard, pasture, but most cases are due to deficiencies in sheltering. Hygiene of bedding regardless of the maintenance system has the same importance on health status of the udder. Even a small amount of dirt on the udder is a health risk (Reneau *et al.*, 2005). Udder health is dependent on the space to rest, comfort and hygienic of bedding, hygiene movement alleys (Hulsen and Lam, 2012).

Lying down has great influence on feeding time and has higher priority than feeding (Metz, 1985). Any deviation from time spent lying cow (10-12 hours/24 hours) leads to decreased levels of growth hormone (Musksgaard and Løvendas, 1996), increase the incidence of licking behavior

(Anger, 2009) and incidence of lameness (Fall, 1996).

Lameness is the best indicator of the welfare of cows (Borderas *et al.*, 2004).

MATERIALS AND METHODS

Aim the research was to identify the conditions of welfare dairy cows in particular taking into account the factors upstream of product: environmental conditions related with environmental conditions by point of view of parameters: temperature, humidity, THI and dew point [(THI= I.T.U= 1.8 x

$$t + 32 - (1 - UR\%)(t - x), \text{ Dew Point} = t - \left(\frac{100 - UR\%}{5} \right) \left[t - \left(\frac{100 - UR\%}{5} \right) \right],$$

lighting standards in terms of the number and size of windows
$$\frac{\text{effective surface area of glass}}{\text{total surface of floor}} = \frac{1}{x}$$

$$\left(\frac{\text{effective surface area of glass}}{\text{total surface of floor}} = \frac{1}{x} \right),$$
 physical volume of air (Lxwxh (m³/h), real air volume, volume

of air necessary
$$\frac{1.25(C_i - C_e)}{C_{ti} - C_{te}}$$
, volume of air necessary after UR% (Q_{UR} % = U/ui-ue) (m³/h), degree of vitiation of the air from the point of view of gas accumulated CO₂ and NH₃, speed

$$\text{airflow } (v \text{ m/s}) = \left[\frac{\frac{H}{Q} - 0.20}{0.40} \right]^2 \left[\frac{\frac{H}{Q} - 0.20}{0.40} \right]^2$$

Other target was to was to assess the indicators of comfort and animal welfare in relation to factors upstream of product (sheltering): CCI (cow comfort index), SSI (Stal standing index), mobility and locomotion score (Cook, 2003), udder hygiene score (fore and rear udders), hygiene score (udder, lower legs, upper lag and flank) (Chiappini *et al.*, 1994; Reneau, 2009).

The determination of physical and chemical parameters was analyzed early in the morning before opening doors and windows when accumulation is greatest. Farms were monitored by point of view of microclimate parameters using the thermometer, hygrometer, Assman psychrometer necessary to calculate the heat stress in term with temperature-humidity index (THI), Dew point (Dp), speed of airflow using cathathermometer, Oldham analyzer was used for determination of noxious gases: CO₂ and NH₃. Volumes of air, surfaces accommodation, and lighting index were calculated after linear measurements of the shelters, windows, chimney

stacks (length, width, height), and calculations after well-established formulas. Statistical data were analyzed using GraphPad and graphical representation based on program Origin 7

Animal welfare has focused on size and cleanliness of the stand, alleys of movement, in terms of hygiene score, udder health (teat score) and incidence of mastitis in livestock studied. Welfare indicators: hygiene score, cow comfort index (CCI), stall standing index (SSI), have been performed on first two hours after milking, because, after Rick Grant (2009) cows are the most motivated to lying down in the last two hours before milking and the first two hours of milking.

The udder health was performed through the identification of teat condition and rapid determination of mastitis using Whiteside modified test (lamella, NaOH 10%, ansa), which is an instrument with good results in the early detection of mastitis, indicating the degree of harm to the quarter of udder and Mastitest.

During the pasturing mobility scoring was analyzed by direct observation of the entire livestock to identify cows with visible problems and those where the possibility of installing the lameness may be early set based on existing protocols in literature.

RESULTS AND DISCUSSION

Because there is no reference price granted of milk, producers' interest to improving the sheltering conditions is not a priority.

Sheltering conditions in terms of microclimate indicate deficiencies in terms of volumes of air, chemical parameters NH_3 , CO_2 during tie-stall period.

Compared to the minimum amount of air /head dependent by accommodated species (21 m³/head of animal (M.A.I.A nr. 76/1979 quoted by Drăghici *et al.*, 2000), shelters are undersized. The volume of air calculated per head: 16.24±1.36 m³ (F1), 12.42±1.68 m³ (F2), 15.75±1.41 m³ (F3), 14.4±1.03 m³ (F4), 16.5±1.41 m³ (F5), indicates extremely significant differences (**P<0.001) in all the five farms reported at minimum standard established. We find extremely significant differences between the volumes calculated at the level of shelters: between F2 vs. F1, F3 and F5 significant differences (*P<0.001) between: F2 vs. F4, F4 vs. F1 and F5. The fresh air requirements satisfy only 59% (F2)-78.57% (F5) per head dairy cow foddered. Neither

in the case of other farms situation is not different on the contrary: required air volumes satisfy the requirements in the proportion of: 68% (F4), 75% (F3) and 77.33% (F1).

Calculation of the necessary air after CO_2 follows the removal and rarefaction of the CO_2 from shelters to maintain concentrations below maximum permitted limits (Man, 2002). Calculation of the necessary the air according to the humidity, establishes ventilated air volume, which by removing excessive water vapor will maintain relative humidity below the maximum allowed in shelters.

Minimum requirements for ventilation after CO_2 obtained, dependent by farm was: 604.48 m³/h (F1), 645.16 m³/h (F2), 620.96 m³/h (F3), 629.03 m³/h (F5). Calculation of the necessary air after humidity indicates values with 44.26% (F1), 50.07% (F2), 53.51% (F3), 45.27% (F4), 44.79% (F5) higher compared with those calculated after CO_2 (1365.51 m³/h (F1), 1288.43 m³/h (F2), 1160.37 m³/h (F3), 1371.50 m³/h (F4), 1404.37 m³/h (F5) (Fig.1).

The number of air changes per hour dependent by air requirements after CO_2 for this parameter to stay within the parameters established 0.3% is around 2 times/h (1.96 times (F5) and 2.85 times/h (F1), and after humidity the number of exchanges hourly rises at 4-5 times/hour in order to prevent condensation. In all five shelters natural ventilation is organized (vertical) by placing one chimney stack in the middle of the shelter which otherwise is undersized.

The presence of a single undersized chimney [(additional height: 0.42 m (F1), 0.32 m (F2), 0.42 m (F3), 0.31 m (F4), 0.28 m (F5)] is not sufficient to maintain noxious under control. Because there is no active ventilation is used unorganized form, which consists on: opening doors or windows, which creates discomfort of animals by creating large air currents in winter. Air speed by opening doors or windows in the winter season showed high values and extremely significant differences (**P<0.001) compared to the normal values (0.2-0.3m/s) on all five studied shelters 0.6±0.22 m/s (F1), 0.86±0.33 m/s (F2), 0.77± 0.32 m/s (F3), 0.92±0.29 m/s (F4), 0.78± 0.31 m/s (F5). Extremely significant values encounter between F1 vs. F4 farms, very significant: F1 vs F2, and significant between F1 vs. F5 and F1 vs. F3.

Fig. 1. The volume of air (real, after CO₂, after humidity)m³/h

Ventilation deficiency is reflected by higher concentrations of CO₂ in winter. The concentration values by CO₂ (%) do not present large fluctuations in level of the five shelters: 0.42±0.03 (F1), 0.6±0.029 (F2), 0.54±0.03 (F3), 0.48±0.038 (F4), 0.52±0.024 (F5), but extremely significant values encounter between F2 and maximum limit allowed in the shelter (**P<0.001) and between F3 and the same limits (**P<0.001). Parameter values NH₃ indicates values below the maximum permitted (26 ppm) in 3 from 5 shelters: 21.2±0.37 ppm (F1), 23.6±0.25 ppm (F4), 23±0.35 ppm (F5) and above the maximum value: 26.8±0.43 ppm in farm F2 and farm F3 26±0.38. The differences between the results obtained on farms are very significant: F1 vs. F2 (**P<0.01), significant F1vsF3 (*P<0.05), F1 and allowed limit (*P<0.05). The value of the temperature into shelters in winter season has

values between 11.5°C (F5) and 14°C (F2). Physical parameters of the microclimate in summer in relation to air temperature fluctuations and compared to the optimum temperature are much higher. Minimum values obtained are between 19°C (F4)-24°C (F3, F5), and maximums values 25°C (F1-F4)-27°C (F2) far beyond the optimum comfort temperature 10-14°C.

Humidity of the air from inside of shelters is close to the maximum (75%) in three of the five shelters (73% F5, 73.5% F3, 74.5% F2). In the shelter F4 this value is exceeded (77.5%), and humidity in the shelter F1 has intermediate value (70.5%-goog).

Because of the values quite elevated: minimum value of air humidity during winter: 68% (F1)-75% (F4) -maximum: 73% (F1)-80% (F4), animal welfare is in decline, because of the

Fig. 2. Temperature Humidity index (THI), Dew Point (DW)

rapidity with which heat losses occur, the air being a good conductor of heat in the presence of water vapor. Although the average value RH%/ shelter during summer lies within the range allowed: 61% (F1)-74% (F5), rank of individual values vary between: 50% (F1)-73% (F4) (minimum limits) and 69 (F4)-81% (F5) % -maximum limit. Combination of the two parameters indicates the comfort of the accommodated livestock. In this sense, THI (temperature-humidity index) is one of the most important indicators who show the overall comfort of the dairy cows. THI represents a good tool predicting the heat stress. In the cold season THI calculated on each shelter depending on temperature and humidity fits in comfort limits in most of the farms with mild values over this limit: 51.1 (F4)-63.05 (F3) (Fig. 2) In summer season inside of the shelters fluctuations are largest and exceed the comfort value (72) which indicates the potential for installation of heat stress: 69.1 (F1) -77.82 (F2), the rank of the values obtained belonging to the alert thresholds.

During the pasturing, the values of THI indicates the alert threshold and possibility of installing the heat stress: 72.92 (F1) -81.32 (F2). In the hot days, night grazing is the best option, but prediction of minimum temperature over night dependent on the temperature and humidity over the day indicate high levels of dew point, which coincide with stifling atmosphere (DW=25.6, 24.8, 20.6, 27, 22, 22.2, 21.8, 26.8.; suffocating (18.4) and only in a few cases comfortable (DW 14) (Fig. 2).

Lighting index I_l of shelters approaching the limits and requirements of the accommodated category (dairy cows) for shelters F1=1/22,

F3=1/21. The other shelters facing with light deficient in terms of natural lighting index: F2=1/30, F4=1/31, F5=1/32. Norma of artificial lighting is below, dependent on the needs of dairy cows. The presence of three bulbs those intensity has 60 W/h in four of the shelters and four bulbs which intensity/bulbs/hour is 60w/h (F1), indicates an index of artificial lighting by 1.71 w/m² (F1), 1.67 w/m² (F2), 1.43 w/m² (F3), 1.50 w/m² (F4), 1.25 w/m² (F5), therefore below the 2.5 w/m².

In most cases, resting spaces are constituted by medium stands. By total space of the shelter: 140 m² (F1-L=20m, w=7 m), 108 m² (F2 -L=18m, w=6 m); 126 m² (F3 -L=18m, w=7 m), 120 m² (F4 -L=15m, w=8 m), 144 m² (F5 -L=18m, w=8 m), in three of the five farms studied, resting area corresponds to medium stand: 2.24 m² (F3, L=1.95 m-w=1.15 m), 2.47 m² (F4, L=2.20 m-w=1.15 m), 2.26 m² (F5, L=1.90 m-w=1.20 m) and in the case of F1 (2.05 m², L=1.7 m-w=1.2 m) and F2 the stand are short (1.6 m²: L=1.5 m-w=1.1 m), which also involves the most problems related to the degree of dirt of the udder and the percentage of mastitis (Fig. 3).

Cow comfort index (CCI). The more accommodation area is more appropriate to the needs of the rest of the cows increase CCI index. From 75% (F1) -70% (F2) in case of short stand: 1.70 sq m/head (F1) 1.65 sq m/head (F2) at 80-85-90% in case of middle stand (F3, F4, F5: 2.24-2.5 sq m/head), therefore, the proposed target of Overton *et al.* (2003) by 85% was reached in two for five farms in winter season.

Stall standing index (SSI) is inversely proportional to CCI index. Number of cows, which

Fig. 3. The resting surface

prefer to stand up increases with decreasing surface accommodation and quality of bedding. The quality and quantity of bedding have the role to provide of animals a warm bed, soft is poor especially in the last period of tie-stall.

THI calculated for the summer season whose averages are between 69.34 ± 4.38 (farm F4) and 74.16 ± 2.32 (farm F3) influences CCI index and SSI index. Between THI calculated and CCI index there is a positive relationship and extremely significant differences ($***P < 0.001$) into the shelters in which THI values are close to the optimal values. The more THI increases, the number of animals who prefer to stand up to intensification the organism cooling by evaporation. In summer season the number of cows who prefer to stand up varies between 10% (farms F1, F4) and 30% (farm F2)

(Tab.1). The same proportion (10 ± 8.52 F5- 30 ± 13.48 F2) we find on the winter but the reason is different. The size of stall and quality of bedding make the difference.

Mobility scoring. Per the entire livestock at the level of the all farms (5), mobility score has a maximum value of 1 ± 0.72 (farm F2) and the smaller within the others' farms 0.9 ± 0.71 (farm F1), 0.85 ± 0.74 (farm F3), 0.6 ± 0.75 (farm F4), 0.65 ± 0.81 (F5). Although, between farms were found not differences statistical point of view. Have been identified dairy cow scored with 2 in proportion of 15% at farms level F1, F4 (Tab. 2). Higher percentage 20% was identified the livestock on

farms (F3, F5) and in the top of farms with leg, hoof problems 30% farm F2. Percentage of dairy cows whose score given was 1 varies between 25% (F5) and 55% (F1). Locomotion scoring is a tool for early identification of problems encountered at by hoof (Sprecher *et al.*, 1997) and is a good indicator of welfare (Borderas *et al.*, 2004).

Between 75 and 80% (F1, F3, F4, F5) between cows observed have been identified with scoring 0-1 which represents the target of each of the farmers: what is mean that over 75% have been identified with score 0-1 and only 60% of the herd belonging farm F2. Between 20 and 40% (F4, F5, F3) were assessed with score 2 which indicates subclinical lameness even if not visible, so that the proposed target of Peffer (2011) for 15% has not been reached. In none of the farms have not found

Tab. 1.

CCI index									
THI F1	CCI F1	THI F2	CCI F2	THI F3	CCI F3	THI F4	CCI F4	THI F5	CCI F5
71.57±	90.00±	73.31±	70.00±	74.16±	75.00±	69.34±	90.00±	72.83±	80.00±
2.47	5.00	4.52	7.75	2.32	7.75	4.38	8.06	2.15	10.95
THI F1 vF. CCI F1*** P<0.001		THI F2 vF. CCI F2 ns P>0.05		THI F3 vF. CCI F3 ns P>0.05		THI F4 vF. CCI F4 *** P<0.001		THI F5 vF. CCI F5 ns P>0.05	
SSI% by total cow/farms during summer									
10±5.27		30±8.16		25±8.16		10±8.49		20±11.54	
THI F1	CCI F1	THI F2	CCI F2	THI F3	CCI F3	THI F4	CCI F4	THI F5	CCI F5
55.84±	75.00±	57.34±	70.00±	58.66±	80.00±	54.19±	85.00±	53.53±	90.00±
1.54	4.26	1.60	13.48	4.58	7.39	3.23	8.53	2.31	8.53
THI F1 vs. CCI F1 ns P>0.05		THI F2 vs. CCI F2 ns >0.05		THI F3 vs. CCI F3 * P<0.05		THI F4 vs. CCI F4 *** P<0.001		THI F5 vs. CCI F5 *** P<0.001	
SSI % by total cow/farms during winter									
25±4.26		30±13.48		20±7.38		15±8.50		10±8.52	

Legend: THI -temperature-Humidity Index, CCI-cow comfort index

Tab. 2. Mobility and locomotion score

	Mobility score (M)	% by heard			Locomotion score (L)	Signification P	Score 0 + 1 considered not lame %	Score 2 Lame %
		Score 0	Score 1	Score 2				
F1	0.9±0.71	30	55	15	1.25±0.44	L1 vs M1 ns P>0.05	75	25
F2	1±0.72	25	45	30	1.4±0.50	L2 vs M2 ns P>0.05	60	40
F3	0.85±0.74	35	45	20	1.25±0.44	F3 vs M3M P>0.05	75	25
F4	0.6±0.75	55	30	15	1.20±0.41	F4 vs F4 M * P<0.05	80	20
F5	0.65±0.81	55	25	20	1.2±0.41	L5 vs M5 ns P>0.05	80	20

Kruskal-Wallis Test: P= 0.32 not significant

cows with clinical lameness. Between mobility score and locomotion score were not identified significant differences among existing animals in farms F1, F2, F3, F5. Between the two indexes were obtained significant differences among the animals from the farm F4 where motility score has a value of 0.6 ± 0.75 , and locomotion score obtained 1.20 ± 0.41 . Motility score can be a good tool for farmers with no experience in mysteries of growing dairy cows and maintenance the health hoof region of the animals.

Hygiene score. The amount of dirt on cows indicates the degree of general farm hygiene. Most of the results of the hygiene score has higher values in the period in which the animals are sheltered and it practice the tie-stall system than in grazing period; the size of stall and degree of cleanliness and the quantity of litter influence definitely the score (Chiappini *et al.*, 1994). To understand the results of the udder hygiene scores were analyzed the aspects related by rest area that were judged with notes from 1 to 4 depending by the size of the stand. Higher score was given of stands with small dimensions: score 3 (F1, F2) and score 2 (F3, F4, F5). Scores given to rest area of livestock were noted with 2 at the level of all farms.

The cleanliness degree of the alleys movement for animals was assessed with 2 (F1, F3, F4, F5) and 3 (F2). The degree of dirt is higher in the case of short stand where, faeces reach into area movement. Values hygiene scores at the level of the five shelters did not reveal significant differences between them, which indicate the same degree of cleanliness of animals/farm ranging from 1.98 ± 0.42 (F4) to 2.21 ± 0.57 (F2) (Tab. 3).

The same insignificant results of the statistical point of view we find between the components, which complete the score hygiene/farms. Nevertheless, the highest score value was found in the upper part of the leg and flank 2.00 ± 0.51 (F4)- 2.33 ± 0.66 (F2).

Udder score values are usually less than 2, very close to four of the five farms 1.99 ± 0.54 (F1), 1.99 ± 0.41 (F3), 1.91 ± 0.48 (F4), 1.92 ± 0.44 (F5) and over 2 in the case of farm F2 (2.11 ± 0.64) but the difference was not significant. Hygiene score has good values for the summer season where, percentage value of animals whose udder score was judged with score 1 and 2 was comprised between 82.5% (F2)-100% (F3). In the winter season, increases the number of dairy cows denoted by 3, and the percentage of dirty udders are between 5% (F5) and 27.5% (F2).

Udder score/overall, calculated according to the average scores obtained after analyzing the degree of cleanliness of the udder (view side and rear) in those two seasons (grazing, stabulation) shows a higher degree of cleanliness grazing season compared to the period in which animals are closed into the shelter, the differences being significant between S1vsW1, S2 vs. W2* $P<0.0$, very significant between S3vs.W3*** $P<0.001$ and insignificant between S4vs.W4 and S5vs.W5. On the other hand, the dimensions of resting surface reveal very significant differences between hygiene score and surface of accommodation/animal head. In this way there is very positive relationship between the size of the stand și total score hygiene in farms F2,F3,F4,F5 and insignificant difference for the farms F1 where total surface of the stand is 1.7 and HS 2.08 ± 0.47 . In summer season, hygiene score are fairly close: 1.95 ± 0.51 (F1), 2.0 ± 0.0 (F3) 1.95 ± 0.39 (F4), 1.9 ± 0.49 (F5).

Teat condition is a good indicator of the quality of environment, milking management and milking system used (www.fao.org, 2009). After examining the degree of udder health teat score average / farms indicates values for 2 and more; which shows that there are not serious health udder problems but individual there are quarters affected by mastitis at different stages: from early stage at subclinical mastitis (Tab. 4)

In farm F1 was analyzed a number of 16 dairy cows (64 quarters). From total examined quarters a percentage of 7.81% are affected by mastitis in early stage, 6.25% and one quarter (1.56%) with subclinical mastitis. The teat score average was 2.09 ± 0.34 , 25% of the quarters are noted by 3 (12.5% plq, 6.25% rpq, 6.25%rrq) and 6.25% (rrq) with note 4. Have been diagnosed with mastitis 22.05% of examined quarter (68) among the dairy cow (17 dairy cow) of F2 farms, from which: 19.1% with incipient mastitis and 2.49% with subclinical mastitis. Teat score/ dairy cows has an average by 2.26 ± 0.5 , proportion the quarters noted with 3 being 27.78% lrq, 27.78%rpq, 11.1% plq and 16.67% rrq. Score 4 was granted in 5.56% for quarters lrq and 5.56% rrq. From 18 dairy cows present in farms F3, mastitis incidence in early stages has been detected in 9.72% of quarters examined. The average of teat score 2.1 ± 0.3 , indicates quarters whose show good health status (2) in high proportion, and quarters noted with 3 in 5.88% (lrq), 1.76% (rpq) and 23.33% (rrq) by quarters.

The average of teat score is 2.15 ± 0.4 for the livestock present in F4 (15 dairy cows), which indicates a percentage of 13.53% for each quarters (plq, lrq, rrq) noted with 3 and 6.67% rpq noted with 4.

The proportion by mastitis was by 13.33% from total number by quarters examined (60) in which 11.65% have been diagnosed with mastitis in early stage and 1.66% with subclinical mastitis. Only

5% of the quarters examined (60) are affected by mamitis from total number of dairy cow present in farm F5. Mastitis in early stage has been identified in a proportion of 3.33% (2 quarters) and subclinical in 1.66% of quarters (1 quarters). Regarding the teat score, the average/livestock was 2.04 ± 0.19 . The proportion of 13.33% represents the quarters noted with 3 (6.67%lrq, 6.67%rpq) and 4 (6.67%lrq).

CONCLUSION

Comparing methods of calculation, it is found that necessary air volumes after humidity indicate a number of hourly air exchange higher, for which reason to the reconstruction, enlargement or sheltering redevelopment taken into study will take into account this parameter.

Hygiene score, CCI (Cow Comfort Index), SSI (Stall Standing Index) indicates a rethinking of the shelters by increasing the area of accommodation and greater attention for udder hygiene and health. The transition from manual to mechanical milking management applied in the farm affects the health of the mammary gland in different proportions.

Easy and trust methods to examine and find mastitis by earlier stage it have to be use for the farmer not just when is necessary. They have to learn that is important to increase the longevity and keep the same production for long time without use any treatment for mastitis.

Tab. 3. Udder hygiene and hygiene score

Farms	Udder score: summer-winter/farms and % of clean udder						Signification P
	Summer S	Dirty udder %	Clean udder %	Winter W	Dirty udder %	Clean udder %	
F1	1.83 ± 0.64	12.5	87.5	2.15 ± 0.36	17.5	82.5	S1 vs W1*P <0.05 -S
F2	1.93 ± 0.66	17.5	82.5	2.30 ± 0.56	27.5	72.5	S2 vs W2* <0.05-S
F3	1.83 ± 0.38	0	100	2.15 ± 0.36	15	85	S3 vs. W3 ***P<0.001 VS
F4	1.85 ± 0.48	5	95	1.9 ± 0.48	10	90	S4vs.W4 - NS
F5	1.85 ± 0.53	7.5	92.5	2 ± 0.32	5	95	S5vs.W5 - NS

Legend: VS very significant, S significant, NS not significant, F-farms

Farms	Hygiene score/ farms	Total udder score/farms	Total upper leg and flank score /farms	Total lower leg score/ farms	P=
	mean±sd	mean±sd	mean±sd	mean±sd	
F1	2.08 ± 0.47	1.99 ± 0.54	2.25 ± 0.61	2.10 ± 0.59	0.16 - NS
F2	2.21 ± 0.57	2.11 ± 0.64	2.33 ± 0.66	2.10 ± 0.67	0.27- NS
F3	2.10 ± 0.30	1.99 ± 0.41	2.20 ± 0.65	2.18 ± 0.50	0.20- NS
F4	1.98 ± 0.42	1.91 ± 0.48	2.00 ± 0.51	1.98 ± 0.53	0.74 -NS
F5	2.00 ± 0.39	1.92 ± 0.44	2.05 ± 0.60	2.00 ± 0.51	0.56 -NS
P=	0.14- NS	0.10- NS	0.09- HS	0.48- NS	

NS – not significant, HS-total hygiene score, C-cubicle house, F-farms, S= summer, W= winter

Tab. 4. Number of cow with mamitis and gravity of affected udder

TS	F1-16 dairy cow	No Q %	F2-17 dairy cow	No Q %	F3-18 dairy cow	No Q %	F4-15 dairy cow	No Q %	F5-14 dairy cow	No Q %
	Mean ±sd	64 7.81	Mean ±sd2	68 22.05	Mean ±sd	72 9.72	Mean ±sd	60- 13.33	mean±sd	60 5
plq	2.12±0.34	2*	2.12±0.3	2*	2.00±0.00	-	2.13±0.3	2*	2.00±0.0	-
lrq	2±0.0	3.12	2.41±0.6	2.94 5*-7.35 4*-5.88 1**-1.47	2.06±0.24	1*- 3.33	2.13±0.3	2* 3.33	2.21±0.5	2 - 3.33 1*-1.66 1**-1.66
rpq	2.06±0.25	1* 1.56	2.24±0.4	4*-5.88	2.11±0.32	2*- 2.77	2.20±0.5	2 - 3.33 1** - 1.66 1*-1.66	2.07±0.2	1-1.66
rrq	2.18±0.54	2 - 3.12 1*- 1.56 1**-1.56	2.29±0.59	4-5.88 3*-4.4 1**-1.47	2.22±0.43	4*- 5.55%	2.13±0.3	2*-3.33	2.00±0.0	-
M/S	2.09±0.34		2.26±0.51		2.1±0.3		2.15±0.4		2.04±0.1	

Legend: TS-teat score, No Q - No Quarters; * mastitis in early stage, **subclinical mastitis, plq- prior left quarter, lrq- left rear quarter, rpq- right prior quarter, rrq- right rear quarter, M/F - mean/farms

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