

Welfare assessment in dairy herds and relationship with health and milk production.

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The aim of this study was to assess welfare by using our model (IDSW: Integrated Diagnostic System Welfare) and blood physiological indices in dairy farms characterized by different milk yield (MY). The model, based on many welfare indices included in three clusters (environment, feeding and animal based indices), has been used in two comparable dairy cow herds (100 lactating cows each). Furthermore, for a better assessment of the real welfare status, a blood sample has been obtained from cows in early lactation for a wide metabolic profile, as well as the frequency of clinical diseases has been recorded. Average daily milk yield was 21 and 33 kg/cow in herd A and B, respectively. The welfare score obtained with IDSW was below the acceptable value (75/100) in herd A (62.5/100); conversely in herd B it was slightly above (76/100). For herd A the major concerns were about environment (barn structures, space availability, management of rest area and groups) and some based animal indices: low fertility (207 days open), poor body condition, low MY, high somatic cell (250000 and 450000 n/mL in bulk milk), mastitis (3.4 clinical mastitis per month), and feet and limbs lesions (particularly around calving). In herd B the clinical diseases prevalence was within acceptable range, and only fertility was not optimal (129 days open). At blood level more frequent inflammatory phenomena have been observed in herd A, with haptoglobin still high at 30 DIM (0.58 ± 0.28 and 0.28 ± 0.12 g/L in A and B, respectively) and lower concentration of albumin, a negative acute phase protein (at 30 DIM 33.7 ± 2.7 and 38.5 ± 1.8 g/L in A and B, respectively). These results seem to confirm that good welfare conditions are possible in dairy farms and this can live together with high milk yield. Moreover, the welfare assessment obtained by using IDSW model has been confirmed by blood and health indices.

Key Words: welfare, dairy cows, physiological indices, milk yield.

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AIM

The aim of this study was to assess welfare by using our model (IDSW: Integrated Diagnostic System Welfare) and some blood indices of physiological-health conditions in dairy farms characterized by different milk yield.

INTRODUCTION

- The objective assessment of the animal welfare in dairy farms is a very complex and controversial task.
- Also the relationship between productivity and welfare is complex and controversial. In our previous researches we have observed in some commercial farms that high genetic merit cows, if properly managed, which means without excessive exploitation, have a welfare improvement and "consequently" they show an increase of milk yield and fertility

MATERIALS & METHODS: experimental design

- Our model of welfare assessment (IDSW: Integrated Diagnostic System Welfare) has been used in two comparable dairy cow herds (100 lactating cows each), characterized by low (L) and high (H) milk yield. The assessment has been done in October and repeated in March of the next year.
- For a better assessment of the real welfare status, blood samples have been obtained from early lactating cows –the most risky group- at the same time of welfare assessment (October and March). In each measurement blood samples were collected from:
 - ✓ all the cows that were in the first month of lactation;
 - ✓ 6-10 cows between 30 and 90 DIM;
- Furthermore, the frequency of clinical diseases has been recorded.

RESULTS: welfare assessment with IDSW

- The Overall Welfare Score was acceptable (greater than 75) only in farm H (Fig. 1).

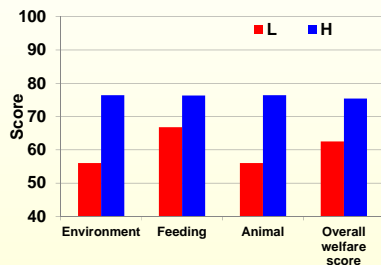


Fig. 1 – Score of each cluster and overall welfare score in herds characterized by low (L) and high (H) milk yield (values expressed as percentage of optimal welfare).

- Also the score of each cluster and component was acceptable (greater than 70 and greater than 60, respectively) only in farm H (Fig. 1 and Tab. 1).

Tab. 1 – Score of the components in each cluster (value expressed as percentage of optimal welfare)

Cluster and component	L	H
Environment		
Housing and equipment	62.5	75.8
Management	46.3	76.5
Feeding		
Feeds	70.1	79.1
Diets	63.6	72.0
Animal		
Physiology, health and reproduction	64.5	69.9
Production	62.2	82.7
Behaviour	61.8	71.1

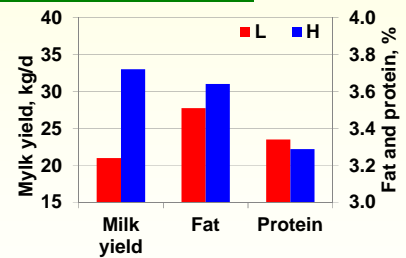
- In herd L the score of each component was around the minimum acceptable value (poor housing, inadequate free stall and inadequate space availability, poor management of rest area and groups).

CONCLUSIONS

The welfare assessment obtained by using IDSW model has been objectively confirmed by blood and health indices. This is of extreme interest because our results confirm that good welfare conditions are possible in modern dairy farms and this can live together with high milk yield.

RESULTS: IDSW (Animal cluster)

- Besides greater milk yield (Fig. 2), cows of H herd vs. L were characterized by:
 - ✓ Fat and protein content of bulk milk similar to L herd;
 - ✓ lower incidence of clinical diseases (Tab. 2);



Tab. 2 – Clinical disease (n/month) observed in L and H herd (100 lactating cows each)

Item	L	H
Retained placenta	0.58	1.20
Metritis	2.80	1.00
Displacement abomasum	0.33	0.22
Clinical mastitis	3.42	0.78
Lameness	1.42	-

Fig. 2 – Milk yield, fat and protein contents of bulk milk..

- ✓ lower content of somatic cells in bulk milk (250,000 vs. 450,000 cells/mL in H and L, respectively).
- ✓ lower days open (129vs 207 in H and L, respectively).

RESULTS: Blood analysis

- At blood level more frequent inflammatory phenomena have been observed in herd L, with haptoglobin still high at 30 DIM and lower concentration of albumin, a negative acute phase protein. Only in herd H the average values of these parameters were included in the reference range. These results highlight better welfare around calving in cows of H herd.

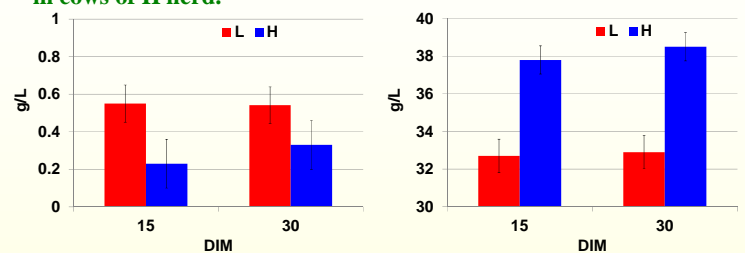


Fig. 3 – Haptoglobin (left) and albumin (right) of plasma in cows of L and H herd.

Materials & methods: measurements and data analysis

- Integrated Diagnostic System Welfare (IDSW). Our model of welfare assessment considers indirect and direct indicators, included in three clusters: environment (35 indicators); feeding (15 indicators); animal response (31 indicators). On the basis of the collected data the model calculates and produces prospects containing:
 - ✓ a score for each indicator expressed in % of its optimal value;
 - ✓ an overall welfare score (OW) expressed in % of optimal welfare (0-100 scale) using weighting factors.
- Blood samples were centrifuged after hematocrit evaluation, and on plasma were measured:
 - ✓ glucose, cholesterol, urea, calcium, phosphorus, magnesium, sodium, potassium, chlorine, zinc, ceruloplasmin, total proteins, albumins, globulins, GOT/AST, GGT, bilirubin, alkaline phosphatase, haptoglobin
- Data processing. The results obtained from blood analysis were processed by using analysis of variance considering the effect of time and of days from calving