period. This research aimed to investigate the relationship between RT and health status in periparturient dairy cow.
The RT of 34 Holstein multiparous cows was measured with AfiTag II pedometer (SAE Afikim, Israel) from –21 to 28 days from parturition (DFP). Blood samples were collected from jugular vein at –14, –3, 1, 3, 7 and 28 DFP for the analysis of the inflammo-metabolic profile. Body condition score (BCS) and body temperature were measured after each blood sampling and milk yield was recorded daily. Cows were retrospectively divided into three groups based on the first clinical disease diagnosed in the first month of lactation: control group (CTR, 13 cows without clinical disease); retained placenta (RP, 10 cows); metritis (MET, 11 cows). Data were evaluated by ANOVA using the MIXED procedure (SAS Inst.).
The MET's RT showed a similar trend to CTR, while RP showed a greater RT compared to CTR in dry period (837 vs. 735 min/d; $p<.05$) and during the first week of lactation (741 vs. 659 min/d; $p<.01$). After that no differences among groups were observed and the mean resting time was 646 min/d. No differences were observed in milk production. Cows with a uterine disease (RP and MET) expressed a more severe inflammatory response after calving, with the increase of haptoglobin ($p<.01$ at 7 DFP) and the reduction of many biomarkers of the negative acute phase response (albumins, paraoxonase, cholesterol, zinc, vitamin A and E; $p<.05$). Moreover, RP showed higher body fat mobilisation (higher NEFA), lower efficiency of fat oxidation (higher ρ-hydroxybutyric acid) around calving and higher body temperature at 7 DFP ($p<.01$). The measurement of RT in dry period confirms its utility as prognostic index of some diseases such as RP, but studies are required to define the reference ranges of RT in healthy cows in different stages of lactation and in different environment conditions.

Acknowledgements
This research was funded by the 'Enrica e Romeo Invernizzi' foundation, Milan, Italy.

P144

Thermography analysis of silage: methodological aspects

Fabio Abeni, Rosanna Marino, Andrea Bragaglio, Teresa Rutigliano

CREA Centro di ricerca Zootecnia e Acquacoltura, Lodi, Italy

Contact: fabiopalmiro.abeni@crea.gov.it

Analysis of face silage temperature during feed-out period could be a way to detect aerobic spoilage related to temperature variations. Besides the traditional use of visual inspection to detect critical zones, a global silo diagnostic may be an interesting tool to summarise structural and management problems.
Sixteen bunker silos filled with different silages (whole corn $n = 8$; whole ear corn $n = 5$; wheat $n = 3$) were examined using thermography to identify descriptors able to quantify the risk for aerobic spoilage related to structural or management characteristics. Infra-red images were captured 1 hour after bunker unloading process during the early hours of winter days. Face silage images were normalised and the main descriptive features (FE) were extracted. Notable correlation between Maximum (Tmax) and Mean Temperatures was detected (Pearson coeff. 0.6718, $p=.004$), meanwhile no correlation was notable between Minimum vs. Mean Temperatures and Tmax vs. Geometric Means. Vertical (Vgrad) and horizontal (Hgrad) temperature gradients were evaluated as well: a qualitative analysis, based on data plots, showed different spatial distribution of gradients where Vgrad displayed widest variations than Hgrad. Considering both descriptive FE and others from gradient matrices, a total number of 14 FE were explored by principal component analysis (PCA): the first two components already explained the 77.93% of total variance; moreover, 96.70% was reached by the first four principal components. PCA revealed a cluster formed by 3 bunkers; their visual technical inspection reported badly maintained and unusual building. A principal factor analysis (PFA) was carried out on the same dataset (16 observations and 14 FE): five principal factors (PF), explaining the 86%, were retained; the first two patterns were mostly populated (5 FE each) with greater scoring coefficients. In the first PF pattern, Standard Deviation and Tmax were linked to minimum gradients values; in the second pattern three over four FE related to Hgrad were grouped and combined with location measures (Mean and Mode).
We explored methods and achieved the preliminary result that descriptive FE are interesting and probably sufficient to investigate face silage temperature. Furthermore, using an unsupervised statistical approach, we identified 3 defective situations related to structural issues and independent of bunker content.

Acknowledgements
The research was funded by Cremona Food-LAB project (Fondazione Cariplo).

P145

Reduction of concentrated feed in dairy cows in the Parmigiano Reggiano area: effects on milk production and quality‡

Luisa Antonella Volpelli[1], Luigi Tamburini[2†], Tiziano Zanni[3], Giovanna Minelli[1], Milena Povolo[4], Valeria Pelizzola[4], Fabio Coloretti[5]

[1]Dipartimento Scienze della Vita, BIOGEST-SITEIA, University of Modena and Reggio Emilia, Italy

[2]*LattEmilia S.C.A., Reggio Emilia, Italy*
[3]*Stalla Sociale Rinascita, Reggio Emilia, Italy*
[4]*Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - Centro di ricerca Zootecnia e Acquacoltura (CREA-ZA), Lodi, Italy*
[5]*Dipartimento Scienze e Tecnologie Agro-Alimentari, Alma Mater Studiorum University of Bologna, Italy*
Contact: volpelli@unimore.it

† in memoriam
‡ A part of the results of the research was presented at 6th AITeL Congress (Trento, September 20th 2018).

A project of technological research, funded by Emilia Romagna Region and aimed to a higher sustainability of dairy chain, involved an experimental trial testing the effect of a reduction of concentrate feed in Frisona cows producing milk for Parmigiano Reggiano Cheese making. Two groups of 15 cows each, with milk production at 9 days in milk (DIM) of 31.7 and 32.1 kg/d, were fed mixed meadow hay *ad libitum* and a growing amount of concentrate feed up to 15 kg (C group) or 12 kg (T group) at the peak of lactation (about 60 days). Milk production, milk fat and protein were recorded from each cow at 9, 47, 96, 131, 166, and 207 DIM; fatty acid composition of milk was analysed on 5 pooled samples/group at 47, 131, and 207 DIM. Milk collected from the two groups of cows at day 161 and 168 was used for micro cheese making. Milk production and milk fat were unaffected by diet, whereas milk protein was lower in T cows at 166 (3.18 vs. 3.39%; $p<.01$) and 207 (3.17 vs. 3.31%; $p<.05$) DIM. Fatty acid composition of T milk showed at 47 DIM significantly lower % of MUFA and PUFA, and higher % of SFA, resulting in higher SFA/UFA ratio (1.70 vs. 1.38; $p<.01$). Both n-3 and n-6 fatty acids were significantly lower in T milk at 47 DIM (n-3: 1.21 vs. 1.44%; n-6: 4.05 vs. 4.57%) and at 131 DIM (n-3: 1.18 vs. 1.37%: n-6: 3.89 vs. 4.83%). CLA levels were similar in the milk of the two groups. The milk collected for cheese making (60 l/group) had similar chemical and bacteriological composition, with the exception of a higher content of thermophilic Lactobacilli in T milk. Rennet coagulation characteristics showed lower curd firmness at 30' in T milk (a_{30}: 24.80 vs. 29.48 mm; $p<.05$), whereas the other cheese making traits were not significantly different between the two groups. Bacteriological traits of the ripened cheese (60 days) from the two groups were also similar.
The results of this field trial indicate that a reduction of 20% of concentrate feed in the diet of high producing cows did not affect milk amount, milk fat and cheese making traits, but caused a partial deterioration in milk protein, fatty acid composition and rennet coagulation. Further research might evaluate the whole lactation, reproductive performances, nutritional and health status.

Acknowledgements
The research was funded by Program of Rural Development 2014–2020 of Emilia Romagna Region, Operation 16.1.01 Focus Area 2A.

P146

Effects of a GH polymorphism on milk production traits in Modicana and Cinisara cows reared in different feeding systems

Adriana Bonanno[1], Serena Tumino[2], Andrea Criscione[2], Antonino Di Grigoli[1], Bernardo Valenti[3], Salvatore Bordonaro[2], Marcella Avondo[2]

[1]*Dipartimento Scienze Agrarie, Alimentari e Forestali, University of Palermo, Italy*
[2]*Dipartimento Agricoltura, Alimentazione e Ambiente, University of Catania, Italy*
[3]*Dipartimento Scienze Agrarie, Alimentari e Ambientali, University of Perugia, Italy*
Contact: mavondo@unict.it

GH gene encodes for growth hormone, a member of somatotropin/prolactin family of hormones, which plays an important role in milk production and metabolism. In bovine a single nucleotide polymorphism (SNP) in exon 5 (g.2141C>G) in GH gene changes the codon CTG to GTG and a Leucine to Valine (L127V) in the mature GH molecule. The aim of the study was to evaluate, in Modicana and Cinisara cows, the effects of genetic polymorphism at GH locus and its interaction with feeding system on milk traits. 155 individual blood samples were collected from 97 Modicana cows (32 in an extensive and 65 in a semi-extensive farm) and from 58 Cinisara cows (32 in 7 extensive and 26 in 6 semi-extensive farms). In the extensive, farms cows were fed exclusively with pasture; in the semi-extensive farms with pasture, hay and concentrate. Bovine GH (bGH) was analysed at the 5th exon. In Modicana, monthly individual milk yield was recorded and individual milk samples were collected. In Cinisara, milk production was recorded once, the day of samples collection. Fat and protein were determined (Combi-foss 6000, Foss Electric, Hillerød, Denmark). In Modicana, milk yield, fat and protein were analysed by GLM procedure for repeated measures of SPSS (SPSS for Windows, SPSS Inc., Chicago, IL, USA). In Cinisara, milk yield, fat and protein were analysed by the univariate GLM procedure of SPSS. The analyses included main effects of GH, feeding system and the interaction GH × feeding system. Genotype frequencies were: LL, 0.61 and 0.34; LV, 0.37 and 0.57; VV, 0.02 and 0.09, respectively in Modicana and Cinisara. Although in both breeds milk yield was lower in VV cows by 2–3 kg/d (respectively in Modicana and Cinisara: LL 9.06 and 12.3, LV 9.24 and 11.4, VV 7.61 and 8.33), these differences did not reach the statistical significance, probably due to the low number of data. Also, milk gross composition was not affected by GH genotype (respectively in Modicana and Cinisara: fat, LL 4.08 and 3.32, LV 3.91 and 3.13, VV 4.04 and 3.62; protein, LL 3.67 and 3.51, LV 3.66 and 3.56, VV 3.64 and 3.71). Results are in line with the literature. The higher energy level of the diets offered