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## Feed efficiency of Italian Holstein dairy heifers in the genomic era – preliminary results.

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Genetic selection of dairy cattle has classically been based on fertility and productivity parameters. In recent years a growing interest in characters related to health and efficiency of the animals has taken hold. The selection of animals with a high feed efficiency can bring benefits in terms of health, productivity and environmental impact. The aim of the trial was to create a dataset useful to build up genetic indexes based on feed efficiency. A first batch of 16 Holstein heifers (mean age  $12.63 \pm 2.90$  months) was selected and housed in a tie-stall of the Centro Zootecnico Didattico Sperimentale (CZDS) of Lodi for the whole length of the trial (35 days). Blood samples were collected and sent to the lab to perform genotyping of the animals. Heifers were fed a composed ration of sorghum silage and total mixed ration, delivered daily on individual feeders to ensure each animal continuous access to the feed. Animals had free access to the water. Feed intake was obtained weighing the supplied ration and the residual the day after. Individual body weight (BW), body condition score (BCS), heart girth (HG) and wither height (W) were measured weekly. Feed-to-Gain ratio (F:G) and Residual Feed Intake (RFI) were calculated using Dry Matter Intake (DMI) data. Two sub-groups of 8 heifers each were ex post created based on RFI results (H-RFI, high RFI and L-RFI, low RFI;  $P < 0.01$ ). Data of the two groups were analysed by a MIXED procedure of SAS. Preliminary results are reported in Table 1. No significant differences were observed between H-RFI and L-RFI for age, weight, F:G and heart girth data, while lower RFI values were statistically related to lower DMI ( $P = 0.01$ ) and higher wither height

gains ( $P < 0.05$ ). Future work will be focused on linking phenotypic results to genomic markers. To do so the trial will be performed on several batches to collect a larger statistical sample. Moreover, the trial will be performed again on the same batch after the first parturition of the animals, so as to investigate the relationship between feed efficiency during the growth phases (use of feed energy for growth and maintenance) and the productive phases (use of feed energy for milk production).

**Table 1:** Average characteristics of the heifers with the highest (H-RFI; n = 8;) and the lowest (L-RFI; n = 8) Residual Feed Intake (RFI) values.

Item	H-RFI	L-RFI	SEM	P-value
Age (months)	12.56	12.67	1.06	0.94
Initial weight (kg)	387.94	361.31	34.12	0.45
Final weight (kg)	420	392.81	33.77	0.43
Average Daily Gain (kg/d)	0.84	0.85	0.08	0.92
Dry Matter Intake (kg)	182.36	146.84	8.72	0.01
Residual Feed Intake (kg of DM/d)	0.35	-0.35	0.08	<0.01
Feed-to-Gain ratio	6.28	5.9	0.82	0.74
Initial heart girth (cm)	171.94	166.56	5.59	0.35
Final heart girth (cm)	180.88	174	5.52	0.23
Heart girth gain (cm)	8.94	7.44	1.15	0.37
Initial wither height (cm)	128.81	125.75	2.6	0.26
Final wither height (cm)	131.75	130.88	2.7	0.75
Wither height gain (cm)	2.94	5.13	0.71	<0.05

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