EFFECT OF FREQUENTLY DISTRIBUTED TOTAL MIXED RATION BY AN AUTOMATIC FEEDING SYSTEM ON FATTENING PERFORMANCE OF BULLS AND HEIFERS

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I. INTRODUCTION

Beef cattle are generally fed a diet containing a higher proportion of concentrates offered *ad libitum* as a total mixed ration (TMR) once per day by a feed-mixer wagon system [1]. However, an increased frequency of TMR deliveries per day can stimulate eating behaviour [2] and provide animals with fresh meals having the same nutrient compositions across all deliveries [3]. Direct comparisons between fattening cattle offered the TMR with a conventional feeding system (CFS) or automatic feeding system (AFS) to prove the effectiveness of the AFS on production performance are still missing in the literature. The aim of this study was to investigate the effect of multiple deliveries of TMR with an AFS in comparison to the CFS on the performance of fattening Limousine bulls and heifers.

II. MATERIALS AND METHODS

A total of 1440 bulls and 1129 heifers imported from France were monitored during the period from January 2020 to March 2022 in northeast Italy. After an adaptation period, animals were balanced for body weight into groups of 10 animals (Initial BW) and were transferred to two barns with different feeding systems (FS). Pen was the experimental unit for body weight (BW), average daily gain (ADG), and feed conversion ratio (FCR). The ADG was calculated by dividing the cumulated gain of a given pen by the total fattening days of its pen-mates. The DMI of CFS cattle was measured weekly at pen level by weighing the amount of TMR delivered to each pen and subtracting the leftover residue 24 h after, and the DMI of AFS pens was downloaded from the AFS software. The average FCR was calculated by dividing the DMI by the ADG of each pen. Animals were slaughtered when they reached a suitable finishing status and their individual carcass weight was recorded. The dressing percentage was calculated considering the cold carcass weight. Grading schemes for the classification of carcasses' conformation and fat cover referred to the Commission Delegated Regulation (EU) 2017/1182. Fattening performances were analysed by sex with a generalized linear model (GLM), considering the FS effect with the batch as a covariate and the Bonferroni adjustment option.

III. RESULTS AND DISCUSSION

There is no significant effect of FS on ADG and FCR of bulls and heifers (Table 1). The ADG is in accordance with results by Greter et al. [4] relating to limit-fed dairy heifers. In contrast to the finding of this study, Schutz et al. [4] reported that ADG increased linearly as feeding frequency increased, but they fed animals with concentrate fed. In the present study, the DMI was greater in bulls fed with AFS, but not in heifers. Schultz [4] observed that the average daily feed intake of fresh matter is higher when animals were fed 3 times per day than once or twice. Furthermore, our study noted that there is no effect of FS on carcass weight (Table 1). Schutz et al. [4] reported carcass weight linearly increasing following feeding frequency. A greater percentage of carcasses graded as 2.00 for fatness was found for CFS than in AFS heifers ($P < 0.001$; Table 1), which suggests that the deposition of fat in AFS

heifers started much earlier than in CFS. It's notable that no carcasses of AFS bulls and heifers were graded as "R", the lowest conformation class that was only found in CFS animals.

Table 1 Effect of feeding system (FS) on growth and carcass performance of bulls and heifers (Lmeans ± SEM)

	Bulls			*P*-value	Heifers			*P*-value
	CFS	AFS	SEM		CFS	AFS	SEM	
Animals, n	701	739			593	536		
Repeated pens, n	72	76			61	55		
Live body weight, kg								
Initial	386	383	3.42	0.52	312	319	3.46	0.31
Final	589	593	2.01	0.18	505	508	2.61	0.61
Days of fattening	131	132	1.71	0.86	157	151	2.28	0.21
Average daily gain, g d^{-1}	1.56	1.61	0.02	0.06	1.24	1.25	0.02	0.85
Dry matter intake, kg g^{-1}	7.92	8.37	0.11	0.01	7.76	7.45	0.15	0.27
Feed conversion ratio	5.15	5.26	0.11	0.50	6.31	6.00	0.16	0.31
Carcass weight, kg	371	373	1.43	0.44	307	308	1.63	0.63
Dressing, %	63.1	62.9	0.18	0.51	60.7	60.7	0.23	0.94
Conformation score, % of carcasses								
class S	15.3	15.9		0.82	11.2	8.59		0.19
class E	84.6	84.1		0.83	88.5	89.5		0.67
class U	0.00	0.00		-	0.00	1.91		-
class R	0.15	0.00		-	0.34	0.00		-
Fatness score, % of carcasses								
2.00	100	99.9		0.99	98.1	93.9		<0.001
3.00	0.00	0.15		0.99	1.89	6.11		<0.001

IV. CONCLUSION

The data showed that an increasing frequency of feed deliveries over the day did not affect the growth performance of bulls and heifers, but it minimize the percentage of poorly graded carcass confirmation.

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