IMPACT OF TYPE OF FLOOR AND GROUP SIZE ON VEAL CALVES' BEHAVIOR AND PERFORMANCES

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I. INTRODUCTION

Veal production and its consumption are specific to France. Indeed, France is the world's leading consumer of veal calves with 3.2 kg carcass weight equivalent per capita. In 2022, approximately 1.2 million calves were slaughtered in France, which is the second largest producer in the world behind the Netherlands and ahead of Italy [1]. Veal calf production in France is organised around specialised fattening farms, mostly in closed facilities with dynamic ventilation. This type of production is organised per batch, with all calves (from dairy farms) arriving at the same time in the fattening facility at an average age of about 20 days. In most farms, they are housed in groups of 5 to 8 calves on wooden slatted floor. Throughout their fattening period, they are fed with milk and solid feed (a mixture of cereals, proteins and fibre) until they leave for the slaughterhouse (after about 5.5 months of fattening) [2]. In a context of structurally decreasing volumes produced and consumed, the veal industry must face up to new societal expectations and to a potential change in regulations concerning housing conditions in order to improve the welfare of calves [3]. At the same time, some farmers are increasing the size of the pens to 10 calves and are installing rubber slatted floor. Only one study has been conducted so far on the effect of group size in veal calves [4]. In this context, a trial was carried out to investigate the impact of the type of floor and group size in veal calf production.

II. MATERIALS AND METHODS

A total of 80 male Prim Holstein calves aged 20 days and weighing 52.7 kg were divided into 4 batches: wooden slatted floor with 5 calves per pen (control, W5), wooden slatted floor with 10 calves per pen (W10), rubber slatted floor with 10 calves per pen (R10), and wooden and rubber mixed slatted floor with 10 calves per pen (M10). The calves were individually housed the first 28 days before being housed in collective pens. Each batch had the same density (1.8 m^2/calf). The calves were fattened for 171 days and received the same feeding plan consisting of 311 kg of milk replacer and 186 kg of solid feed. Twice a day (at 7:15 am and 5:30 pm) and during the whole fattening period, reconstituted milk was distributed individually in buckets with feeding teats. The solid feed was then distributed in collective troughs. Water was available to the calves. The health protocol was identical for all calves (vaccination on arrival against RS-BVD and ringworm, as well as an anti-lice treatment). Calves were weighed every 28 days. At each weighing, a cleanliness score was given to each calf according to a score grid. Individual milk consumption was measured, as well as collective solid consumption (per pen). All sanitary treatments were recorded individually and daily. Regarding calves' activities, scans sampling observations on a 5 minutes time step were carried out from 6 am to 8 pm on 3 days, complemented by continuous sampling observations (D22, D75 and D145). Pedometers were placed on one of the back leg on 8 calves per batch for at least 2 weeks around the 3 days of observations. They were used to measure the lying/standing position and the number of steps taken by the animals. Significance differences ($P<0.05$) among samples were determined by analysis of variance (ANOVA) using the Least Square Difference method of the General Linear Model procedure of R (R project 4.2.3).

III. RESULTS AND DISCUSSION

Regarding group size, W10 calves walked more than W5 calves (+20% at the middle of the fattening period, NS and +40% at the end, $P<0.05$) (Table 1). However, the group size had no effect on lying time (68.2% of the day spent lying for both batches at the beginning of fattening period, 66.9% at the middle

and 65.5% at the end), nor on ruminative or stereotypic activities or on the cleanliness of the calves. It also had no impact on the number of health treatments per calf (3.2 for W5 vs 3.7 for W10, NS). Total growth rates were also similar (1244 g/d for W5 vs 1236 g/d for W10, NS) as for the carcass qualities. Concerning the type of floor, the calves preferred the rubber floor for lying: 90% of the lying in M10 was done on the rubber floor. However, the lying time was identical between W10, M10 and R10 (Table 1). R10 calves moved more than W10 calves (334 steps/day vs 288 at the beginning of the fattening period, 524 vs 427 at the middle and 466 vs 414 at the end), with M10 being intermediate. 33% of R10 calves were scored dirty during fattening vs 18% for M10 and 1% for W10. This result can be explained by the characteristics of the two slatted flooring and the percentage of empty/full ratio of the slatted floor (32% for the wooden flooring vs 17% for the rubber flooring). This state of cleanliness had an impact on calf grooming (4.8% of daily activity for W10 vs 7.1% for M10 and 5.7% for R10 at the middle of fattening period). Floor type had no impact on digestive or respiratory health problems. In terms of zootechnical performances, floor type had no effect on calf growth or carcass weight. Nevertheless, it had an impact on carcass colour (5% coloured carcasses for W10 vs 35% for M10, $P<0.05$, vs 30% for R10).

Table 1. Calf activity by batch and period

Indicator	Period (days)	W5		W10		M10		R10		P-value (W5-W10)	P-value (W10-M10-R10)
		Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM		
Number of steps	Start-up	301	122	288	33	301	52	334	52	0.82	0.78
	Growth	357	20	427	108	447	89	524	142	0.13	0.33
	Finishing	296	12	414	54	450	27	459	38	0.07	0.75
Lying time (%)	Start-up	68.5	2.1	67.9	2.4	70.2	0.8	66.7	1.0	0.75	0.13
	Growth	66.5	6.3	67.2	1.2	67.6	0.7	66.2	1.0	0.64	0.38
	Finishing	65.5	0.7	65.5	1.1	65.0	2.2	62.9	1.4	0.93	0.27

Start-up=D0-D56; Growth=D56-D112; Finishing=D113-D171

IV. CONCLUSION

These results show that increasing the group size impacts the mobility of the calves during fattening but does not affect their lying time or other behavioural indicators. Calves preferred to lie on rubber slatted floors when offered and made more movements on this type of floor, but this did not affect their lying time or other behavioural indicators.

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