ORGANIC RABBIT PASTURING: EFFECT OF GRAZING DENSITY ON GRASS INTAKE AND GROWTH OF THE RABBIT.

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ABSTRACT

Two grazing densities (D1=0.4m² and D3=1.2m²/rabbit/day) were compared using two groups of 5 movable cages on pasture, housing 1 or 3 rabbits for the same grazing area of 1.2m²). Rabbits were fed only by grazing, from weaning (45 days old) for 36 days. Herbage allowance and intake was measured by sampling the pasture before and after grazing, every week. The pasture allowance pasture averaged 6.6 t DM/ ha, for a herbage height ranging from 60 to 78 cm. The grass height meanly consumed ranged between 20 and 35 cm, and group D3 consumed a twice higher height compared to group D1 (30 vs 16 cm consumed, P<0.05). For D1 group, the pasture intake increased from 40 to 100 g DM/d/ rab. between day 1 and day 36, while it ranged from 25 to 60 g DM/d/rabbit fro D3 group. The pasture intake capacity of the rabbit averaged 75 and 38 g DM/d respectively for group D1 and D3 (P<0.01). Rabbits of D1 group consumed 9.38 kg of fresh matter (260g /day) over the 5 weeks of fattening, while those of group D3 consumed 4.76 kg (P<0.05). The growth rate was poor (meanly : 12 g/d), and lower for D3 compared to D1 group (8.4 vs 15.5 g/day, P=0.051). In conclusion, at the standard grazing density (0.4m²/rab./day) the pasturing capacity of the rabbit was not covered. According to the pasture quality, a complementary concentrated feed may be recommanded to reach a commercial weight (2.4 kg) within 5 or 6 weeks after weaning.

Key words: pastured organic rabbit, pasture, herbage allowance, grazing

INTRODUCTION

Organic agriculture is developing worldwide. In this context, organic rabbit production is developing in France. Following the principles of agroecology applied to livestock systems (Dumont et al., 2013), and more specifically the principles of organic agriculture, it consists in raising rabbits with a link to the soil, i.e. in movable cages or paddocks enabling them to graze grasslands (Photo 1). Still as their production practices constitute a rupture with conventional rabbit systems (battery farming), farmers lack basic information such as rabbit intake and growth at grazing and the factors able to influence these variables. Our study thus develops original knowledge on rabbit herbage intake and growth at pasture. It is indeed determining whether the 0.4m²/rabbit/day grazing area given by the current specifications of organic agriculture, is sufficient to allow optimal growth of rabbits during fattening. Thus, we compared to grazing density: the standard density as a control (0.4 m²/day/rabbit) or a low grazing density with 1.2 m²/day/rabbit, suing two sets of 5 movable cages housing 3 or 1 rabbit each.

Photo 1: Movable cage on pasture plot (grazing area = 1.2 m² + a shelter of 0.4 m²), with 1 or 3 rabbits per cage

MATERIALS AND METHODS

Animals and experimental design

The trial was carried out at the experimental farm of Perpignan University, on two groups of rabbits housed in movable cage on pasture. It started in May (24th, 2016) and finished 36 days later on June 29. Ten movable cage (see figure 1 and photo 1) were used. A movable cage consists of a wooden shed of 0.4 m² (1m x 0.4m) and a grazing area of 1.2 m² (1m x 1.2m) to meet the French regulation on organic rabbit farming; they

were moved daily to offer a new grazing area.

Rabbits were born and raised until weaning at the experimental unit. They originated from a mix of traditional breeds, including Argenté de Champagne and Papillon. Rabbits were transferred from the nursery to movable cages at 45 d old, and were allotted in two groups according to the litter origin and weaning weight (meanly 1.3 kg): group D3 with 5 movable cages housing 3 rabbits, with 0.4m² of pasture per rabbit per day; and group D1 with 5 movable cages housing 1 rabbit, with 1.2m² of pasture per rabbit per day. D3 and D1 cages were alternately disposed on the pasture plot. Rabbit were fed only by grazing; no pelleted feed was given in supplement. Fresh water was continuously available. Live weight and feed intake were weekly checked.

Grazing management and measurements

At grazing, D1 and D3 cages were alternately installed with a distance in-between cages of 0.5 m. They were then moved daily in parallel throughout the field to provide rabbits with fresh herbage every day. Thus, herbage allowance was not controlled. It varied depending on available biomass in the surface area of each cage.

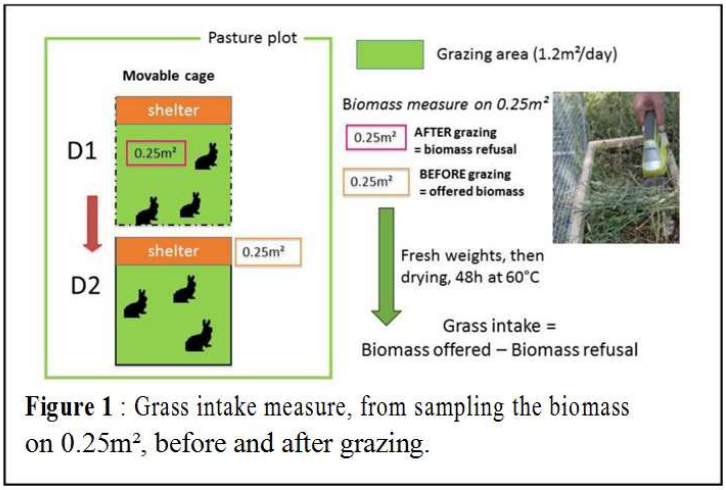

Figure 1 : Grass intake measure, from sampling the biomass on 0.25m², before and after grazing.

To account for these variations, herbage samples were cut every week with an electric grass shear at 5 cm high (height corresponding to the bottom of the cages) at two areas of each cage: (i) between the cage and the neighboring one so as to measure herbage allowance at grazing and (ii) after moving the cage so as to measure herbage refusals after grazing (figure 1). Herbage samples were weighted fresh to measure herbage fresh matter (FM) allowance and refusals. They were then dried during 48 hours at 60°C and weighed again to measure herbage dry matter (DM) allowance and refusals. For each day, intake was calculated as the difference between herbage allowance and refusals for both fresh and dry matter. The whole herbage intake for the period (1-36d old) was estimated from the daily intake multiplied by seven. In addition, the height of the herbage was measured with a graduated stick at days 1, 8, 15 and 22, before grazing and after grazing, on seven plots per cage to calculate the herbage height consumed by the rabbits. Dry matter (DM) content of pasture samples was determined at 60°C for 48 h. All data were analysed using SAS software. A single factor variance analysis was used to estimate the effect of the animal density on pasture on performance traits.

RESULTS AND DISCUSSION

Pasture composition and biomass offered along the study

The pasture was mainly composed of Sainfoin (Onobrychis viciifolia) with 40% of the fresh or dry biomass (table 1), and of Avena Fatua (30% of the dry biomass). Then, about 30% of the biomass was composed of various plants (wild oat, plantain, etc.).

Table 1: Botanic composition of the pasture

Plant sample*	Fresh matter weight		Dry matter weight (g)	
	g	% of total biomass	g	% of total biomass
Sainfoin (*Onobrychis viciifolia*)	133.0	40.4	34.2	40.3
Wild oat (*Avena Fatua*)	81.1	24.7	26.0	30.7
Fennel (*Foeniculum vulgare*)	49.0	14.9	6.5	7.7
Urosperm (*Urospermum dalechampii*)	20.3	6.2	3.4	4.0
Plantain (*Plantago media*)	18.7	5.7	4.7	5.5
Barley	14.5	4.4	5.6	6.6
Ray Grass	12.4	3.8	4.4	5.2

* one sampling at day 7 of the study, for 0.25m² (three replicates).

The biomass production (allowance) of the pasture was relatively stable and high, over the 5 weeks of the study (figure 1 and 2), with a fresh matter allowance averaging 23.6 t/ha. Over the whole study, the dry matter content of the pasture averaged 28.5%, and accordingly the dry allowance reached 6.6 t DM/ ha.

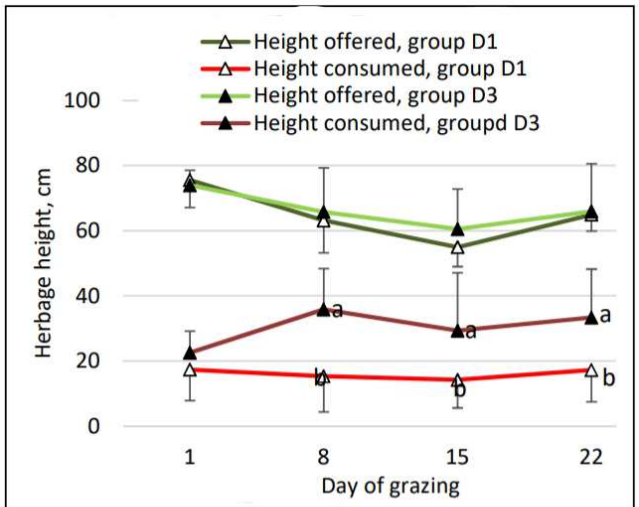

Figure 2 : Height of herbage offered and consumed according to the grazing density*.
*: D1: 1.2m² pasture/ day/1 rabbit; D3: 1.2m² pasture/ day/3 rabbits.
A,b : within a grazing day, means having a different superscript differ at the level P=0.05

Compared to classical references for pasturing (I re m A w cc ac cc ar tv (3 H th cr pr ra

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grazing density was at 1.2 m²/rabbit (group D1). When t pasture intake was about half lower (P<0.05), ranging fr intake were twice higher compared to previous studies of intake of only 30g DM/d with 60g of pelleted feed intake (

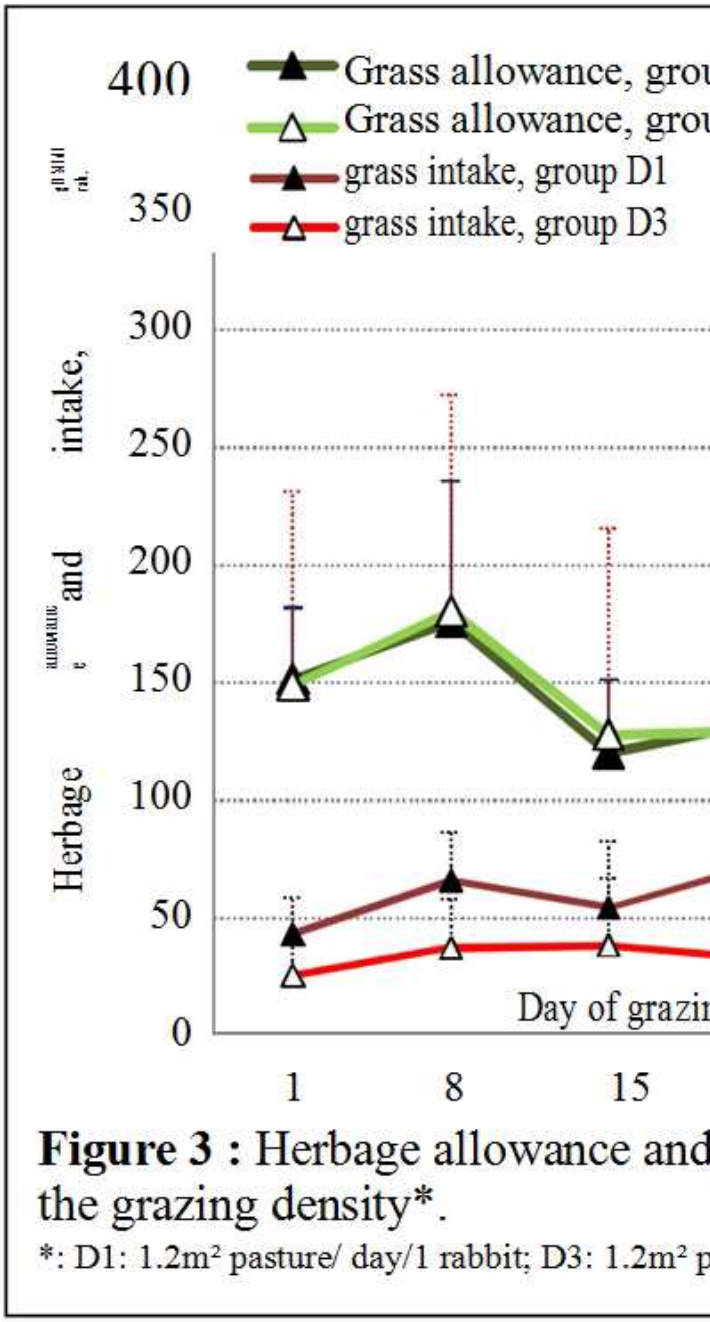

Figure 3 : Herbage allowance and the grazing density*.
*: D1: 1.2m² pasture/ day/1 rabbit; D3: 1.2m² p

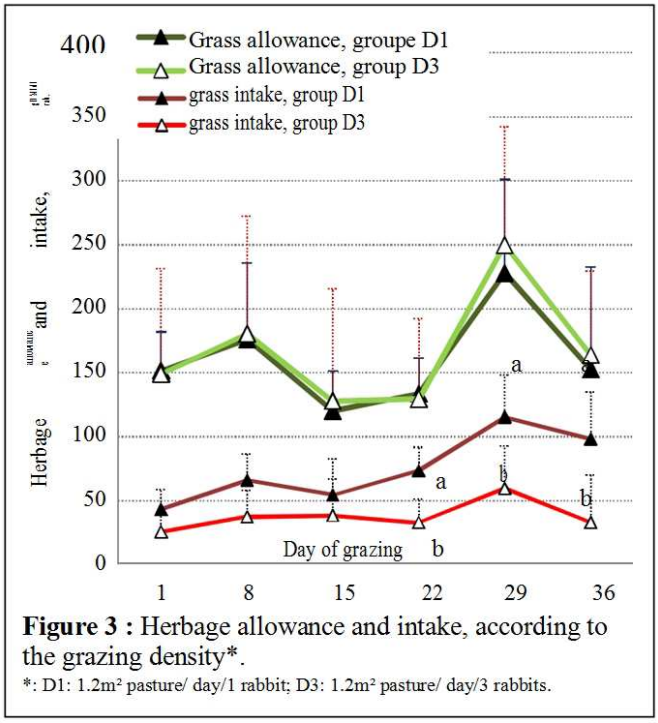

Figure 3 : Herbage allowance and intake, according to the grazing density*.
*: D1: 1.2m² pasture/ day/1 rabbit; D3: 1.2m² pasture/ day/3 rabbits.

For the low grazing density, the overall herbage mass consumed within the 5 weeks of fattening reached 9.38 kg of fresh matter (260g /day, table 2), that correspond to 2.70 kg of DM. In contrast, for the standard grazing density (group D3=0.4m²/rab.) the biomass consumed was half lower (P<0.001, table 2) averaging only 4.76kg (1.35 kg DM). The growth rate was poor (meanly 12 g/d); it was half lower for D3 compared to D1 group (P=0.051), but this must be confirmed with a higher number of replicates. In comparison, if a pastured rabbit could received a 60g pelleted feed (or cereals) as a complément, the growth rate reached 25 g/d for a standard grazing density.

CONCLUSIONS

At the standard grazing density (1.2 m²/rab./day) the pasturing capacity of the rabbit was not covered. A low grazing density (0.4 m²/rab./day) allow the rabbit to express fully its pasturing capacity.

Therefore the growth rate will be dependant mainly of the herbage quality. According to the pasture quality, a complementary concentrated feed may be recommanded to reach a commercial weight (2.4 kg) within 5 or 6 weeks after weaning. Further studies are necessary to beter reference the performances of the pastured rabbit.

Photo 2: Movable cage on pasture plot after 24h grazing according to grazing density.

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Table 2: Grass intake and growth of rabbits according to pasturing density.

Whole period 1-36 days	D1	D3	rVC, %	Prob.
Grass intake, g fresh matter/d/ rabbit	260	132	17	<0.001
Grass intake, g dry matter/d/ rabbit	75.0	37.7	18.1	0.011
Live weight at day 1 of grazing, g	1354	1415	163	0.85
Live weight at day 36 of grazing, g	1910	1720	159	0.18
Weight gain (1-36d), g/d	15.5	8.4	43.3	0.051

D1: 1.2m² pasture/ day/1 rabbit (n=5 cages); D3: 1.2m² pasture/ day/3 rabbits (n=5 cages); rVC: residual variation coefficient.

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