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► To cite this version:

Charlotte Paes, Patrick Aymard, Anne-Marie Debrusse, François Laperruque, Carole Bannelier, et al.. Data set on early feed intake and growth performances of rabbits fed during the suckling period with pellets differing in diameter or compression rate using a double-choice testing design. *Data in Brief*, 2020, 29 (105196), 10.1016/j.dib.2020.105196 . hal-02796662

HAL Id: hal-02796662

<https://hal.inrae.fr/hal-02796662>

Submitted on 24 Mar 2024

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Contents lists available at ScienceDirect

Data in brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Data set on early feed intake and growth performances of rabbits fed during the suckling period with pellets differing in diameter or compression rate using a double-choice testing design



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ARTICLE INFO

Article history:

Received 25 November 2019

Accepted 20 January 2020

Available online 30 January 2020

Keywords:

Rabbit

Feed intake

Onset of feeding behaviour

Doe's nest quality

Pellet compression rate

Pelleting

ABSTRACT

Weaning is a critical period for the health of rabbits, with a high sensitivity to digestive diseases. Allowing early consumption of solid feed in the nest of the suckling rabbit could help to maintain its health around weaning. In general, previous studies have focused on feed intake of rabbits when they are able to leave the nest, i.e. around 16 days. Herein, we provide a unique dataset of the dynamics of the onset of feed intake in suckling rabbits from 8 days to weaning. We quantified the solid feed intake behaviour and determined the dietary preferences for pellets according to their physical properties using nine pellets differing in diameter or compression rate. Additionally to the data provided in Paës et al. [1] we provide (i) the description of the nine pellets processing (ii)

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Nutrition
Feed presentation

the description of the 3 point-scale system for nest quality evaluation, (iii) details on the device used to provide pellets in the nest, (iv) milk intake data and milk intake curve calculation and (v) pellet intake data according to physical characteristics.

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Specifications Table

Subject	Animal Science and Zoology
Specific subject area	Rabbit nutrition, feed technology, feed physical characteristics, livestock intake behaviour
Type of data	Table Figure
How data were acquired	Feed intake in the cups in the nest was calculated based on the weight of feed offered and refused measured with an OHAUS scale (Parsippany, NJ, USA). Milk intake, litter weight and feed intake in the feeders were assessed using a scale (SWR08-10S Plateforme 310X275 Trolley, Balea, Saint Mathieu de Trévières, France) linked to an automatic recording system (Teo, Balea, Saint Mathieu de Trévières, France) with bluetooth connection. Individual weights were recorded at 50 and 64 days of age using a scale (SWR08-10S Plateforme 310X275 Trolley, Balea, Saint Mathieu de Trévières, France) linked to an automatic recording system (AGPA, Balea, Saint Mathieu de Trévières, France) with bluetooth connection. Nest quality was evaluated thanks to a 3 point-scale score based on representative photographs.
Data format	Raw Analyzed
Parameters for data collection	The experiments to determine early intake were conducted under standard farm procedure for rabbits with an adapted feeding system. Double-choice feeding test of pellets processed with different dies were conducted in two trials. In a first trial, pellets of 2.0, 3.2, 4.0 and 6.0 mm diameter were tested in pairs. In a second trial, pellets of identical diameter (2.5 or 4.0 mm) but manufactured with three die channel lengths: 10, 12, 14 mm or 18, 20 and 24 mm were compared in pairs.
Description of data collection	Early intake measurements were performed at the litter level before weaning. Pellet intake was measured daily in the nest between 8 and 17 days of age and at 18, 21, 25, 28, 32 and 35 days of age in the feeder. Milk intake was measured at 3 or 4, 7, 10, 14, 17 and 21 days by weighing the does before and after nursing. Litters were weighed after suckling at 3 or 4, 10, 14, 21 and 28 days of age. Individual rabbit weights were recorded at 50 and 64 days of age.
Data source location	INRAE, PECTOUL Experimental Unit Castanet-Tolosan France
Data accessibility	With the article and raw data on (i) the nest quality scoring according to a 3 point-scale system, (ii) kits milk intake; (iii) pellet intake in double-choice preference test in the nest; (iv) pellet intake in double-choice preference test in the feeders; (v) weight of litter until weaning; and (vi) weight of the rabbits after weaning are available in this article as 6 supplementary files.
Related research article	Paës C, Fortun-Lamothe L, Bébin K, Duperray J, Gohier C, Guené-Grand E, Rebours G, Aymard P, Bannelier C, Debrusse AM, Gidenne T and Combes S 2019. Onset of feed intake of the suckling rabbit and evidence of dietary preferences according to pellet physical properties. <i>Animal Feed Science and Technology</i> 255, 114223. https://doi.org/10.1016/j.anifeedsci.2019.114223

Value of the Data

- These data provide detailed information about manufacturing characteristics of pellets designed for suckling rabbits, their intake dynamics and the growth performances of rabbits between 8 and 64 days of age
 - These data will be useful to academic and business researchers in the animal feed sector
 - These data present two major interests. First, they could be useful to researchers interested in creep feeding innovations helping to find out relationships between physical characteristics of pellets and intake in young rabbits. Second, they will contribute to a better understanding of the physical characteristics of pellets resulting from controlled technical processes
 - In this way, these data could be implemented in predictive models for both onset of intake behaviour and technical processes of pellet manufacturing
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1. Data description

The objectives of the study were to determine the intake dynamics at the onset of feed intake in suckling rabbits. Solid intake was quantified inside and outside the nest from 8 days to weaning at the litter level. In addition, we measured consumption of milk. We determined dietary preferences of pellets according to their physical properties at the litter level using pellets differing in diameter or compression rate. A schematic representation of the experimental design is presented in Fig. 1. In this experiment, nine pellets were processed by Tecaliman (Nantes, France). Table 1 provides all technical characteristics of pellet processing. Pellets were provided in cups placed in vertical holding devices fixed to the nest (Fig. 2).

The nest quality was scored 2 days after farrowing. Fig. 3 provides the 3-point scale reference used to assess nest quality. Distribution of scorings over the two trials is presented in Fig. 3 (raw data are provided in [supplementary file1](#)). Milk intake was measured every 2 or 3 days (raw data are provided in [supplementary file2](#)) and lactation curve was calculated until 21 days (Fig. 4) and further used in statistical modelling. Rabbits had *ad libitum* access to pellets in the nest and in the feeders before weaning. After weaning rabbits were fed restricted. The amount of feed delivered after weaning is detailed in Table 2. Raw data on intake in the nest and in the feeders, weight of the litters until weaning and individual weight of the rabbits after weaning are provided as raw data in [supplementary files 3-6](#).

2. Experimental design, materials, and methods

All experimental procedures were conducted in compliance with the recommendations for animal care in experimentation in agreement with the EU Directive 2010/63/EU [2] and the Journal Officiel de la République Française [3].

In order to determine whether the technological characteristics of the pellets influences young rabbits feed intake, at the onset of solid feeding behaviour, two trials using double-choice tests were carried out (Fig. 1). In the first trial, pellets from dies with different diameters were tested. In the second trial, pellets from different die lengths were tested at constant diameter. Four pellets were tested for the diameter test (pellets noted A, B, C and D) and six pellets were tested for differences in compression rate ratio (feeds C, E, F, G, H, I) (Table 1). Pellets were provided *ad libitum* in cups placed in vertical holding devices fixed to the nest (Fig. 2) and in feeders in the cage. We provide here more details on pellet processing characteristics, nest quality evaluation, milk production measurement and milk curve calculation and intake data before weaning for each kind of pellet.

2.1. Pellet processing characteristics

The same mixed mash was used to produce the nine experimental pellets. Die dimensions were modulated to produce the different pellets and parameters of conditioning, cooling and drying were kept similar during manufacturing (Table 1). Conditioning occurred with steam addition at 1.7 bar before pelleting with a Kahl 14 – 175 pellet press through one of the nine experimental dies. Pellet length was set at 8 mm for all the pellets. Physical characteristics of the feed obtained (hardness, durability, particles size and hydration properties) are presented in Paës et al. [1].

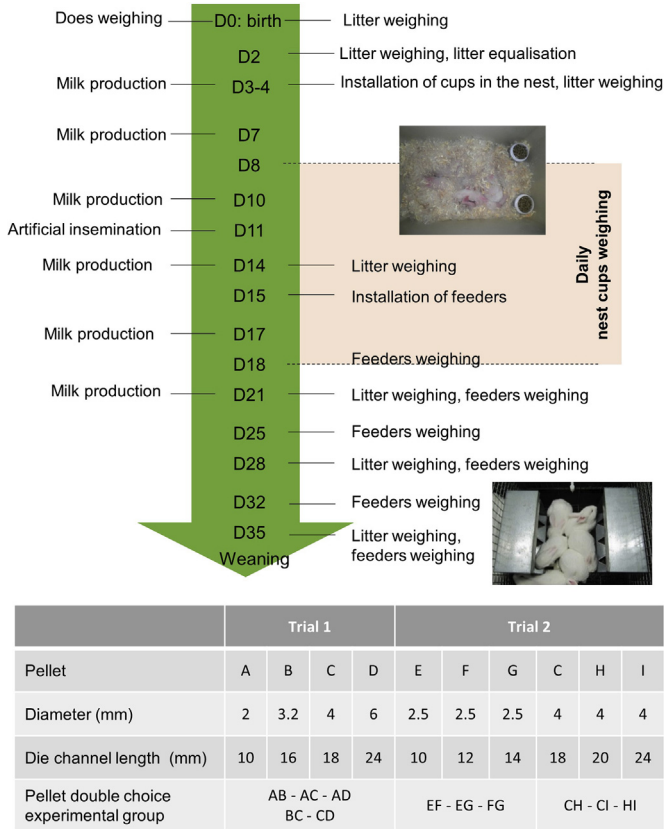
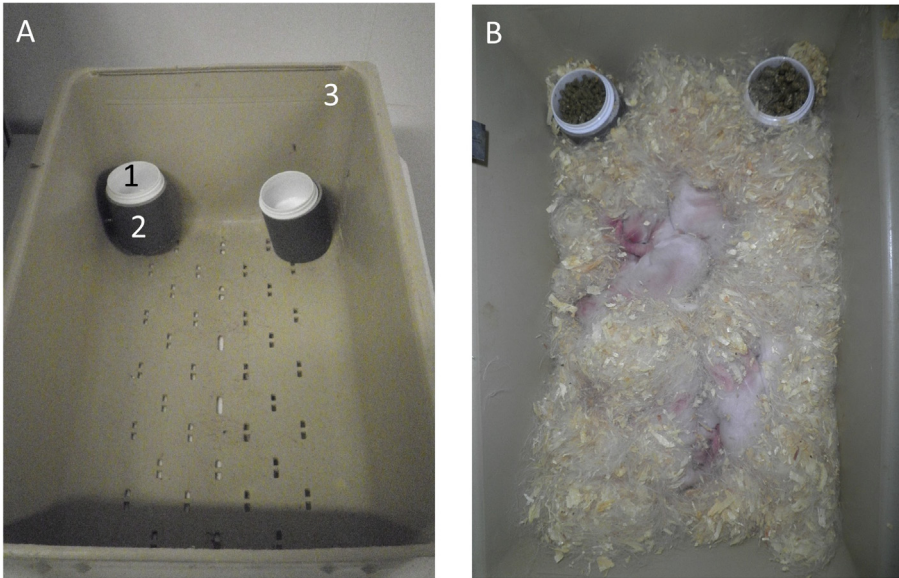


Fig. 1. Timeline scheme. The days of age (D) of the rabbits are indicated by the time line. Nest quality was assessed at day 2, before litter equalization. All rabbits had access to a double-choice test with pellets differing in their physical properties. From 3 days in trial 1 or 4 days in trial 2–18 days of age, rabbits were provided pellets in two cups placed in the nest according to their treatment assignment. In trial 1, six combinations of two pellets differing in their diameters were tested. In trial 2, pellets of the same diameter but with different compression rates were tested in pairs: 3 combinations with the diameter 2.5 mm and 3 combinations with the diameter 4 mm. A total of 10 litters were assigned to each one of the paired test comparison using stratified randomization (does parity for trial 2, litter weight at 2 days, location in the farm).

Table 1
Manufacturing characteristics of the pellets.

	A	B	C	D	E	F	G	H	I
Die channel diameter/length (mm)	2/10	3.2/16	4/18	6/24	2.5/10	2.5/12	2.5/14	4/20	4/24
Steam (bar)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Temperature (°C)									
Mash at the entrance of the conditioner	12.3	16.4	17.5	17.2	15.5	17.4	16.0	17.4	15.5
Mash leaving the conditioner	65.1	65.1	65.2	65.2	65.1	65.1	65.1	65.2	65.2
Pellets just pressed	79.1	81.4	73.3	72.1	72.3	73.7	74.5	73.0	73.2
Flow rate (kg/h)	56.0	56.0	55.0	56.0	55.6	56.1	55.4	55.3	56.6



- 1: Cups: 30 mL; height: 32 mm; diameter: 40 mm (GOSELIN®, Le Mans, France)
- 2: Holder: PVC tube ; height 60 mm; diameter 50 mm
- 3: Nest box: length 38 cm; width 25 cm; height 20 cm

Fig. 2. Device for feeding rabbits with pellets in the nest (A). Illustration of double-choice preference test in trial 1 with pellet A on the left and pellet D on the right of the nest (B). The kits were three days old. Cups were inverted laterally each day in the nest.

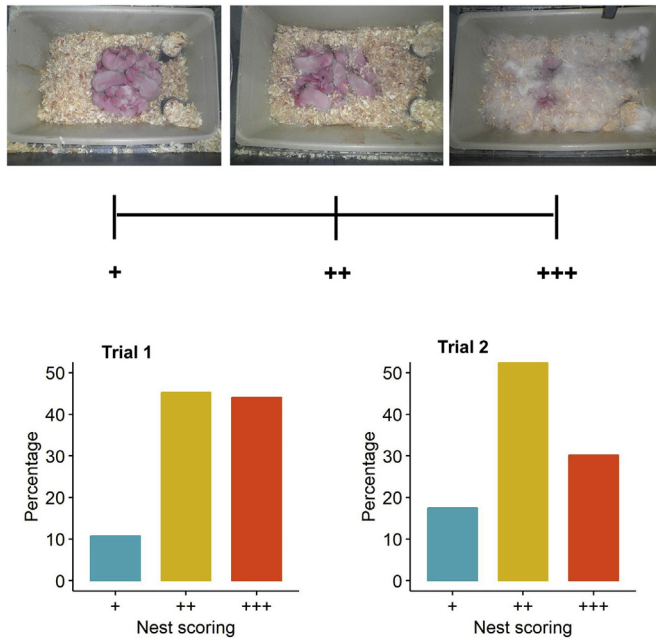


Fig. 3. Three point-scale to assess nest quality and scoring distribution over the two trials.

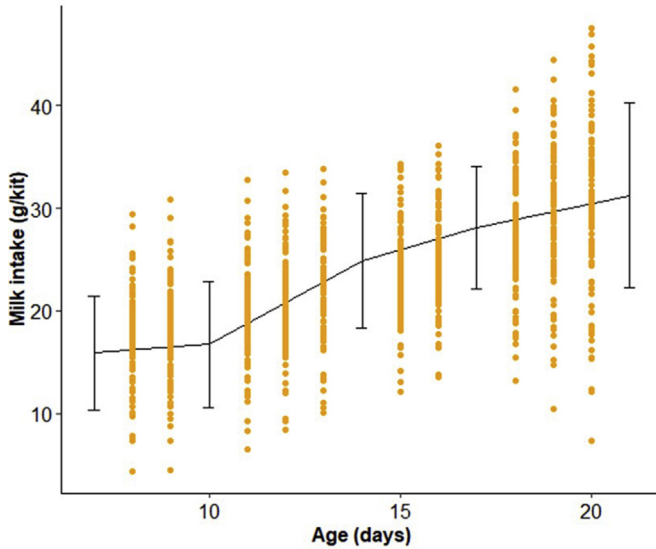


Fig. 4. Milk intake curve from 7 to 21 days of age. Black line represents data collected in the farm at 7, 10, 14, 17 and 21 days in the two trials. Orange dots stand for calculated data obtained with a quadratic model.

Table 2

Amount of feed distributed after weaning from 35 to 59–60 days of age.

Age (days)	Feed distributed (g/rabbit/day)	
	Trial 1	Trial 2
35	50	90
36–42	60	90
43–49	75	130
50–52	90	140
53–56	110	140
57–59	125	150
60	140	<i>Ad libitum</i>
61–72	<i>Ad libitum</i>	<i>Ad libitum</i>

2.2. Animal handling

Litters were equalized to ten rabbits at 2 days of age, there was no replacement in case of death. During the first trial, females were inseminated on day 11 after farrowing and could therefore be both lactating and pregnant. Suckling was controlled until day 21 e.g. kits had access to the does for a fixed time (circa 10 minutes). The kits were individually identified from weaning (day 35). After weaning, rabbits were divided into groups of 5 (preferably between littermates). Any individual or litter showing clinical signs of illness (diarrhea, ...) was removed from the experiment (mortality and eliminations were recorded daily). After weaning, sanitary events were recorded and presented in the [supplementary file 6](#) with the following attributes: 11 stands for skinny rabbits, 12 for rabbits showing breathing problems, 13 for rabbits with digestive problems, 15 for diarrhea cases, 21 stands for very skinny rabbits, 23 for rabbits with severe digestive problems, 27 for wry neck, 43 when one abscess or more were observed, 50 stands for healthy rabbits.

2.3. Housing

The detailed characteristics of the housing used to control separately the doe's feed intake and that of its litters were provided as specific figures in Paës et al. [1]. Briefly, before weaning, the animals were raised in cages with separate mother/kits feeding systems. The mother's area was accessible to the kits and contained a raised feeder that was impossible for the kits to access. The space dedicated to kits was separated from that of the female by wire mesh and it contained two feeders that the female could not reach and a nest box. The nest was accessible to the female through a sliding door that allowed controlled suckling. After weaning, the animals were housed in collective cages of five (width: 78 × length: 46 × height: 30 cm).

2.4. Nest quality measurement

Nest quality was measured by a scoring system based on a 3-point scale for both trials two days after birth, before litter equalization. It consisted in evaluating the amount of fur deposited by the female rabbit in the nest: a score of 1 was given if no fur is present, 2 when fur was present in the nest but did not completely cover the kits and 3 when the fur completely covered the kits (Fig. 3).

2.5. Milk consumption measurement and milk intake curve calculation

Milk intake is estimated by weight difference of the female before and after nursing [4] using a scale (SWR08-10S Plateforme 310X275 Trolley, Balea, Saint Mathieu de Trévières, France) linked to an automatic recording system (Teo, Balea, Saint Mathieu de Trévières, France) with bluetooth connection [5,6]. Raw data are provided as [supplementary file 2](#). Estimation of daily milk consumption from 8 to 21 days was needed to investigate its relationship with early solid feed intake. Milk intake curve was thus modeled for each doe and each trial thanks to data obtained at 3 or 4, 7, 10, 14, 17 and 21 days (Fig. 4). Quadratic equation was used since it is one of the best models to predict the daily milk yield of rabbit does [7]:

$$Y = a + b \cdot X + cX^2$$

where Y is the daily milk intake and X is the rabbit age; a, b and c are estimated coefficients specific to each female for a given trial.

2.6. Feeding plan and double-choice experimental design

Kits had an *ad libitum* access to the pellets from 3 to 17 days in two cups (30 mL; height: 32 mm; diameter: 40 mm; GOSSELIN®, Le Mans, France) fixed to the nest in a holder to keep them in place while facilitating the daily handling for intake measures (Fig. 2) and from 15 days onwards in two feeders introduced into the kits space until weaning. Both, cups and feeders were inverted laterally each day in the nest or cage, respectively. After weaning, animals were quantitatively fed restricted until 60 days of age to achieve an average daily gain of 40 g/day. The amount of feed distributed is given in Table 2. Rabbits were then fed *ad libitum* until commercial slaughter weight.

The litters (n = 60 in trial 1 and 63 in trial 2, respectively) were equalized to ten kits, 2 days after birth by cross-fostering or culling. The litters were then distributed into one of the six experimental groups in each trial depending on their mothers' parity and location in the farm (n = 10–11 litters per experimental group). Each experimental group corresponded to a complete double-choice feeding protocol where rabbits had access to two pellets provided in the two cups in the nest and in the two feeders in the kits' space. The experimental group AB refers to the pellets A tested against B and similar terminology was used for other groups. Diameter preferences were evaluated in trial 1 and six combinations were tested: AB, AC, AD, BC, BD, and CD. Difference in compression rate was evaluated in trial

2 for two pellet diameters resulting in six other combinations: EF, EG, FG and CH, CI, HI for 2.5 and 4 mm, respectively.

2.7. Early Intake measurements and growth performances

Before suckling, cups were removed daily from the nest to prevent the doe from eating in the nest, then weighed (OHAUS, Parsippany, NJ, USA) and reintroduced after suckling. A significant intake was observed from 8 days on. Data were indicated as missing when at least one of the two cups containing the pellets was spilled or soiled or if waste had been observed. Outliers were defined as being outside the confidence interval [Average daily consumption for a given experimental group $\pm 3 \times$ Standard deviation]. Data are provided as [supplementary file 3](#).

Feeders for pellet intakes measurements were weighed at 18, 21, 25, 28, 32 and 35 days of age. Litters were weighed after suckling at 3 or 4, 10, 14, 21 and 28 days of age. The weight was automatically recorded using a scale (SWR08-10S Plateforme 310X275 Trolley, Balea, Saint Mathieu de Trévières, France) linked to an automatic recording system (Teo, Balea, Saint Mathieu de Trévières, France) with bluetooth connection [4,5]. Raw data are provided as [supplementary files 4 and 5](#). Individual weights were recorded at 50 and 64 days of age using a scale (SWR08-10S Plateforme 310X275 Trolley, Balea, Saint Mathieu de Trévières, France) linked to an automatic recording system (AGPA, Balea, Saint Mathieu de Trévières, France) with bluetooth connection [4,5]. Raw data are provided as [supplementary files 6](#).

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

This work was supported by the Institut Carnot Santé Animale, France [eFeedIT-ICSA-2015] and by the INRAE metaprogram focused on the integrated management of animals' health (GISA; eFedBiota). The authors gratefully acknowledge the assistance of M. Moulis and J-M Bonnemere at the rabbit farm.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.dib.2020.105196>.

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