OWC 2020 Paper Submission - Science Forum

Topic 4 - Innovation in Organic farming: "thinking out of the Box"

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A NEW SIMPLIFIED PERFORMANCE REFERENCING SYSTEM ADAPTED TO ORGANIC RABBIT FARMING

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Abstract: A referencing system to collect and analyse performances of French organic rabbit farms was created using an Excel sheet. Performances of reproduction were compiled on 6 farms over 3 years of production (2015-2017). Does are housed in movable cage on pasture or in individual paddock, the livestock size averages 33 does. The productive time of a doe averaged 374 d. and was variable (75%). Female mortality averaged 17% over the period, while culling reached 10%. With 4.8 matings, 2.7 parturitions per female/year were obtained (60% fertility rate), for a total of 21.6 rabbits born alive and 16.7 weaned (26% mortality from birth to weaning). The yearly turnover of a full-time rabbit farmer (80 females) would potentially be around 26.3k€/year. The database is actually extending to a larger number of farms, thanks to the deployment of a smartphone application (GAELA), that enable a management assistance of the rabbit farm and data collection, synchronized to a national securised database.

Introduction: Organic rabbit farming (ORF) is still a niche market in France, but the consumer demand exceeds the supply from about fifty farmers. ORF French specifications contains several rules, such grazing, natural breeding, slaughter from 100 days of age (photo 1). In conventional rabbit farming, the referencing of breeding performance in a national database has been practiced for more than 30 years. This allow identifying the technical progress or difficulties of rabbit farms, and to guide development and research efforts. In independent or organic rabbit farming there is no performance benchmarking. This lack of technical references is an obstacle to the development of the "alternative" rabbit sector, since this information allows farmers and supervisors to establish, organise and size an installation project. Our work (CUNIPAT project) thus aims to develop a computer tool to build a first referencing system for ORF

Material and methods: The study belongs to the CUNIPAT project (INRA-ITAB), and was carried out in 3 steps: selection of farms, development of an Excel application and data collection from farms, and finally compilation and analysis of performance data. From a first list of organic rabbit farms (Roinsard *et al.*, 2016), 6 were selected ccording to several criteria: organic certification, located in France, 3 years of performances saved, voluntair to participate to the study. The second step consisted in developing a computer tool, based on the Excel software, easy to use (called RTS2CuniBio), to collect technical data from the breeding books of the 6 breeders. RTS2CuniBio allows compiling data from several farms

and over a flexible period of time (1 month to several years); for instance we have selected a 3 years period (1/01/2015 to 31/12/2017) on 6 farms. Our analysis was restricted to reproductive performances (Table 1).

The Excel application is organized into 8 sheets: a menu to easily access the other sheets; a sheet for farm description; a "breeding" sheet listing females and males and their performances (Figure 1); a "reproduction" sheet to track matings, palpation, births and weanings; a "fattening" sheet to track batches that arrive and leave fattening; a "feedlot management" sheet to monitor crawl spaces and their occupancy rates; a "technical performance" sheet, which automatically calculates various indicators (Table 1) for a flexible period of time; and finally a "data quality" sheet which allows an analysis of the validity and reliability of the data (number, quality, etc.)). Check formulas have been added to sort and correct any wrong data (e. g. input error on delivery dates, or mating dates, etc.). This Excel spreadsheet (with instructions) is available on request from the authors.

Over the 6 farms and for three years, 719 does and 133 bucks were registered corresponding to 2857 mating. The total number of delivery reached 1604, for a total number of weaning of 1052. The size of the doe livestock averaged 33.1 for one running year, but with a high variability, from 7.9 (recently installed farm, with livestock in progression) to 61.6 (farm installed for more than 10 years). The buck livestock averaged 7.3 corresponding to a doe/buck ratio of 4.5. The breeding systems used also show a fairly wide diversity: the maternity unit was run in movable cages on pasture for 3 farms, in individual parks for 2 others, in a sheltered enclosure (open funnel) with external access for the last one. The fattening unit was run in fenced pens for all farms.

Fattening data were provided by only one farm: 3054 rabbits were weaned over this 3-year period, and 2419 rabbits completed their fattening, corresponding to 10.4 "fattened" rabbits per productive female per year (or 5.3 per parturition). Knowing that self-renewal was 4% and self-consumption was 1.8%, the mortality rate between weaning (64.3 days) and sale (110.3 days) was 15.0%, for a fattening period of 46 days.

Results: The productive time of a female is relatively long (table 1) compared to conventional rabbit farming: more than one year but up to 2 years (variability of 75%). Female mortality averaged 17% (up to 59%). The reproduction rhythm was rather extensive with 5 mating per doe and per year, leading to 2.7 parturitions. Thus, the parturition interval was almost 3 months, while the fertility rate averaged 60% but varied widely according to the farm. As a result, the number of live born rabbits per female per year averaged 16.7, but varies greatly between farms (1.3 to 26.8). Calculated over more than 1000 litters, the age at weaning varied from 40 to 68 days, including late weaning for three farms (68 to 71 days), and earlier weaning for 2 farms (40 and 53 days on average). The mortality rate before weaning averaged 26% but with a high variability between farms (18 to 34%). The number of weaned rabbits per parturition averaged 6.2, and nearly 17 weaned rabbits per female per year. We calculated the productive potential of organic rabbit farming. On a basis of 4 ha for pasture, 1 ha is dedicated to 60 breeding cages (50 females, 8 males, 2 young females) according to the French regulation (2.4m²/rabbit), while 3 ha are allocated to growing rabbits. With 3 litters of 6 weaned rabbits per year (50 females), 900 growing rabbits are produced (1400 for 4 litters weaned at 7 weeks old). The economic potential is calculated as follows: for a mortality rate of 24% after weaning, the number of rabbits sold is 684, corresponding to an annual turnover of 16,416€ (1.6kg carcass/rabbit at 15€/kg). Of course, a productivity improvement in the unit of reproduction (e.g. reaching 4 litters per female per year, lower mortality rate) will greatly increase the annual turnover. Previous technical and economic surveys indicates that one full-time person can manage about 80 breeding females and their offspring (Roinsard et al., 2016), for a field area of 5ha (+ 4ha for cereal to complement the feeding). Thus, the turnover of a full-time organic rabbit farm would potentially be 26.3 k€/year based on the technical data calculated in our study.

Table 1 : Descriptive analysis of the performances in the reproduction unit.

Productive time and mortality of breeding rabbit livestock		
	Mean	Variability (min-max)
Male production time, days	463	±312
Female production time, days	374	±281 (207-576)
Renewal rate of males, %year	52.9%	(0.0-69.2)
Mortality rate of females, %/year	17.2%	(4.0-57.8)
Culling rate of females, %/year	9.5%	(0.0-64.4)
Renewal rate of females, % year	26.7%	(4.0-81.4)
Reproductive performance		
Fertility rate, %	60.3%	30.2-72.7
Nb parturition/female/year	2.	0.8-3.8

	7	
Parturition interval, days	11.6	191.2-137.5
Nb born alive/delivery	8.0	7.7-8.2
Nb born alive/female/year	21.6	17.5-34.8
Nb weaned/parturition	6.2	4.5-6.7
Nb weaned/female/year	16.7	1.3-26.8
Age at weaning, days	58.8	40.5-68.3
Mortality rate before weaning, % (on 4 farms)	26.2	18.4-37.0

Discussion: Compared to conventional farming , we found in ORF a similar female mortality (Coutelet, 2015), but a lower litter size (-20%), and a twice higher mortality rate of young rabbits before weaning. But our results were similar to those obtained in one ORF trial by Lebas et al. (2002). Overall, the performances are modest, but a significant technical progress could be achieved, particularly in the management of the reproducing female livestock. The database is presently extending to a larger number of farms, with the deployment of a smartphone application (GAELA) that allows a fast, direct and unique entry of livestock data "at field", synchronized to a secure database. GAELA "app" is simple and ergonomic, and assists the farmer in the daily management of a rabbit livestock (calendar of actions, alerts, ...). GAELA is intended to replace the traditional livestock paper notebook, and will allow performance analysis at national level.

References: Coutelet G., 2015. Performances moyennes des élevages cunicoles en France pour l'année 2014. Résultats RENACEB. Cuniculture Magazine, 42, 39-40 (http://www.cuniculture.info/Docs/Magazine/Magazine2015/mag42-037-Renaceb.html)

Lebas, F., Lebreton, L., Martin, T., 2002. Lapins Bio sur prairie : des résultats chiffrés. Cuniculture, 29 (2), 74-80.

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Image:

Photo 1 : Organic rabbit farming - movable cages on pasture (© INRA, T. Gidenne).

Image 2:

Figure 1 : Screenshot of the Excel application "RTS2CuniBio" : sheet "performances"