A PARTICIPATORY APPROACH TO DEFINE OBJECTIVES, CRITERIA AND INDICATORS FOR EVALUATING THE SUSTAINABILITY OF RABBIT REARING UNITS

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ABSTRACT

This work describes four steps involved in the construction of a method for evaluating the sustainability of rabbit farms: 1) determining the boundaries of the system evaluated; 2) defining and weighting sustainability objectives and criteria; 3) choosing sustainability indicators; 4) converting the indicator measurement into a score to facilitate interpretation of the results. The work was developed collaboratively as part of a participatory approach based on building consensus between experts, rabbit industry actors (producers, breeders, slaughterers...), citizens, and consumers. The outcome was a survey containing 110 questions related to economic, environmental, and social goals that can be used to evaluate sustainability of the rabbit breeding unit. The method was validated by in-field application in a national network of 82 reference farms. Analysis of the data gathered from this network enabled us to produce national data on sustainability performance and economic, social, and environmental efficiency.

Key words: Sustainability assessment, methodology, rabbit, indicator.

INTRODUCTION

Several reports have shed negative light on livestock in terms of environmental issues, such as on land use change, greenhouse gas emissions, water overdepletion, and pollution (FAO, 2006). Furthermore, animal production industries are often targeted by animal rights associations in which they lobby against battery farming and the use of a reproductive cycle they consider to be too intensive. These trends compel a concerted effort across all animal production industries, including rabbit farming, to join forces in order to propose management innovations that can lead to more sustainable systems. Sustainability should therefore be considered as a direction guiding constructive change for the design of innovative systems (Vavra, 1996). Several definitions for sustainable agriculture have been proposed (Brundtland, 1987; Hubert, 2002). According to Bonny (1994), sustainable agriculture is economically viable, ecologically safe, and socially acceptable, but successful transition hinges on measurements of sustainability performance (Sink, 1991).

The objective of our work was to develop a method for diagnosing the sustainability of monogastric animal production systems relevant to rabbit breeding. The method, dubbed DIAMOND (DIAgnosis of sustainability of rearing units for MONogastric animals, aDaptable to species), can be used under field conditions via direct surveys of farmers. This paper presents the approach used for defining objectives and sustainability criteria, choosing indicators, and obtaining a sustainability score. The mean sustainability performance of French rabbit farms measured by this method has previously been described elsewhere (Fortun-Lamothe *et al.,* 2012).

MATERIALS AND METHODS

Constructing the evaluation method

The construction procedure involved four steps. The **first step** was to define the boundaries of the system studied. Earlier methods have evaluated the farm as a whole (SOLAGRO, 2002; Vilain, 2003) or the industry as its own entity (Pottiez *et al.*, 2011). The DIAMOND method studies sustainability at the rearing unit level. If a farm runs several different rearing units (e.g., poultry, rabbits, pigs...), they are studied separately. The **second step** was to define, within each of the three goals of sustainable development (economic, environmental, and social), the sustainability objectives assigned to the rearing units. These objectives represent the results targeted for the unit to be considered sustainable. The general objectives were divided into specific criteria. This set of sustainability objectives and criteria (called 'GOLD') was created collaboratively as part of a participatory approach organized at national level based on the principles set out by Rey-Valette *et al.* (2008). Thus, the objectives and criteria were co-defined by a committee of about thirty people including experts, sector representatives (producers, breeders, feed industry, slaughterers...), and consumer-citizen representatives. However, these sustainability objectives generally involved total and sometimes complex notions that were difficult to analyze directly, making it necessary to use sustainability indicators in order to study system response to these objectives (Becker, 1997). The **third step** thus consisted of proposing one or more indicators for each of the sustainability criteria. These indicators were easily-measurable variables that provide information on other variables that are more difficult to access. To be accepted, an indicator must possess certain qualities: relevancy, sensitivity, reliability, and simplicity (Gras *et al.*, 1989). The **fourth step** was to transform the indicator measurements into scores for cross-comparing different systems. Indeed, as the indicators were expressed in different units (e.g., euros, %, and days), whereas comparing these absolute values would be meaningless. The transformation of indicator measurements into scores took into account the weight given to each criterion. This weight was defining via a participatory approach (as in step two). The scores were summed for each indicator within a criterion, then within an objective, and finally within a sustainability goal, to obtain quantitative economic, environmental, and social performance scores. The farm's final sustainability score was the lowest of the scores on these three performance goals (economic, environmental, and social), as proposed by Vilain (2003).

Validating the evaluation method

For validatation purposes, the method was applied to the French reference network of rabbit farms (Cunimieux) that comprises 82 rabbit breeding units selected as being representative of national production (Jentzer, 2009). The survey was carried out in 2010-2011, and covered economic data from March 2009 to June 2010. The validation process involved a series of steps. First, we checked user acceptance of the method. For this purpose, users and French rabbit industry decision makers were regularly asked to validate the objectives, criteria, indicators, and their scores. Bockstaller and Girardin (2003) stated that an indicator could be considered validated if it was scientifically designed, sensitive, and relevant, as well as useful to and used by the intended users. We thus checked that the proposed indicators were easy to complete and sensitive to changes in practices (i.e., discriminating). Finally, we checked that the transformation of indicator measurements into scores that covered the full range of variations without losing sample variability (i.e., ensuring that farms did not all have the same score).

RESULTS AND DISCUSSION

Two general objectives were identified on each sustainability goal (Table 1). The total score for each of these three goals was equal and was set at 100 points (or sustainability units). The actors involved in the development of the method jointly decided that: i) to meet the economic goal, it was just as important to be economically profitable (50 points) as to be flexible and adaptable (50 points), ii) to meet the social goal, it was just as important to meet the demands of the citizens and consumers (50 points) as to preserve the quality of life and working conditions of the producers (50 points), and iii) to

Table 1: Sustainability objectives, criteria, and indicators used for the assessment of rabbit production units.

Goal	Objective (50 points)	Criterion (10 points)	Indicator	Unit
Economy	Is economically profitable	Economic viability	Net profit	€/doe/an
		Labour use efficiency	Income – costs / income	%
		Efficiency of the production process	Number of rabbits produced/ work units	No. animals
		Technical independence	Local animals and food	%
	Is flexible and adaptable	Economic profitability	Net profit / income	%
		Economic specialization	Rabbit farming share of total income	%
		Sensitivity to public support	Public support	€/doe
		Financial autonomy	Annual repayments	€/doe
		Versatility	No. farming activities, crop production	No.
		Transmissibility	Age of farmer, year of creation of the rabbit unit, geographical location	Qual*
Environment	Use resources sparingly and/or produce renewable resources	Production of renewable resources	Solar panels, solar water heating, biogas generator	Qual*
		Fossil-fuel energy use	Consumption of motor fuels, gas and electricity	€/doe
		Water use	Water consumption	€/doe
		Biomass use	Feed conversion rate	
		Land link	Unit/slaughter house/food factory distances	km
	Protect and manage ecosystems	Quantity and management of effluents	Quantity of effluents / type of effluents	m3
		Maintenance of biodiversity	Number of plant species, number of rabbit species/races of interest	No.
		Hygiene measures	Sanitary airlock/wash basin/underfloor space	Qual*
		Prophylaxis	Vaccination and deworming practices, corpse management	Qual*
		Use of antibiotics	Antimicrobial frequency treatment index (IFTA)	n/animal/j
Social	Preserve the producer's quality of life and working conditions	Socio-economic viability	Net profit/working time	€/h
		Rest and time-off organisation	Free weekends/ night work	No. + Qual*
		Toughness of the work	Health/stress/automation	Qual*
		Involvement in professional life	Membership of a group/trainees	Qual*
		Integration in local life	Public reception/problems with neighbours	Qual*
	Respond to the demands of the citizen-consumer	Quality and traceability	Certification / age at slaughter	J + Qual*
		Practices and animal welfare	Mortality / reproduction rate / hormone/restriction	% / J / %
		Animal welfare and living conditions	Temperature / floor / stocking density	Δ°C / Qual* / n/m²
		Short marketing chain	Direct selling	% of total sale
		Non-agricultural services	Non-trade service/landscape management	Qual*

*Qual: qualitative indicators.

meet the environmental goal, it was just as important to sparingly use non-renewable resources and, in turn, produce renewable resources (50 points) so as to protect and manage ecosystems (50 points). Each objective comprised five criteria, each worth 10 points (Table 1).

In order to develop an evaluation of sustainability under production conditions by surveying breeders, 111 indicators were proposed to evaluate the response of rabbit farm managers to the 30 sustainability criteria areas (18 economic-goal indicators, 45 environmental-goal indicators, and 48 social-goal indicators). The indicators were quantitative (45%), qualitative (55%) or subjective (5%). Of the 82 farms surveyed in 2010 used to validate the method, 76 provided analyzable data (5 farms failed to report their water consumption and one farm failed to report its energy consumption; Fortun-Lamothe *et al*., 2012). Although certain indicators still need improvement, the results showed that the requisite "ease-of-use" for choice of indicators was largely met. Moreover, for this methodological development, we developed a simple indicator for evaluating use of antibiotics on the rabbit farm (IFTA; Fortun-Lamothe *et al*., 2011). Table 2 presents examples of how indicator measurements were

Table 2: Example of indicators and their transformation into scores.

Goal	Economy		Environment		Social	
Criterion	Economic viability		Fossil-fuel energy use[1]		Rest and time organization[2]	
Indicator	Net profit €/doe/an	10 points	Energy use €/doe/an	8 points	Holidays (w/yr)	4 points
Example scoring scheme	>90	10				
	80-90	9	<2	8	>3	4
	70-80	8	2-3	7	2-3	3
	60-70	7	3-4	6	1-2	2
	50-60	6	4-5	5	0-1	1
	40-50	5	5-6	4	0	0
	30-40	4	6-7	3		
	20-30	3	7-8	2		
	10-20	2	8-9	1		
	0-10	1	>9	0		
	<0	0				

[1] The criterion "Fossil-fuel energy use" was evaluated using two indicators : Energy use (€/fem/an; 8 points) and Motor fuel use (€/fem/an; 2 points).

[2] The criterion "Rest and time organization" was evaluated using five indicators: Holidays (w/yr; 4 points), Week-end not worked (n./batch; 2 points), Night work (n./batch; 2 points), Free time (question; 1 points) and Organization satisfaction (question; 1 point).

transformed into scores for one criterion under each sustainability goal. If the accounting data were available, it took about half a day to carry out a complete sustainability diagnosis on a rabbit farm.

CONCLUSIONS

The aim of this work was to develop a survey-based method for assessing rabbit rearing unit sustainability. The participatory and collaborative construction approach used made it possible to raise awareness among rabbit industry actors to the challenges of sustainable development and to the multicriteria methods of sustainability assessment. It has helped French rabbit industry players to collectively evolve towards a shared vision of sustainable rabbit production. It is a positive approach resolutely aimed at addressing the challenges of the future and oriented towards positive progress rather than negative criticism. The fact that our work was applied in the French network of rabbit farms proved a valuable asset by enabling a true real-world validation of this method. Analysis of the data gathered from this network enabled us to produce national data on sustainability performance and economic, social, and environmental efficiency (Fortun-Lamothe et al., 2012). By identifying weaknesses, it will also help pinpoint further research priorities.

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