ECONOMIC SUSTAINABILITY OF RABBIT FARMING INNOVATIONS

Bertazzoli A., Rivaroli S.*

Department of Agricultural Economic and Engineering, Alma Mater Studiorum – University of Bologna,
Viale Giuseppe Fanin 50, 40127 Bologna, Italy
*Corresponding author: sergio.rivaroli@unibo.it

ABSTRACT

Although multiple definitions have been proposed for the concept of animal welfare, the interpretation offered by Webster is of particular interest for the purposes of this study. The author, despite basing himself on the definition proposed by the UK Farm Animal Welfare Council (FAWC), lists five determining factors of animal welfare, including the prevention of the animal's physical and mental exhaustion induced by intensive productive and reproductive activities. With specific reference to rabbit farming, it is necessary to underline that research predominantly focuses on evaluating the impact which technical innovations - in terms of animal population density, cage sizing and the improvement of environmental conditions - have on animal welfare, and is underpinned by a predominantly anthropocentric viewpoint. A limited number of studies focus on evaluating the impact of organisational innovations which are aimed at protecting and respecting the physiology of the animals. The purpose of this study is to evaluate the economic sustainability of adopting a less intensive insemination rhythm with a view to safeguarding the welfare of breeding does. The findings of this study reveal that the innovation in question is able to guarantee positive financial returns for the business, as well as a substantial reduction in the risks associated with the production activity.

Key words: Cost-volume-profile analysis (CVP), Animal welfare, Post-weaning rhythm.

INTRODUCTION

Animal welfare is a topic of much public and scientific debate, such that it has led to important changes in European legislation aimed at meeting the growing demand for high-quality, safe food and ethical production. The extensive European legislation in this area (Eurogroup, 1995) is essentially based on the "protocol of protection and welfare of animals" (Horgan *et al*., 2006). In particular, reared animals must be treated as "sentient and conscious beings", can experience emotions and are therefore not comparable to other agricultural products. Nevertheless, different definitions have been proposed for the concept of animal welfare, reflecting the actual characteristics of the applicable regulatory environment and the measures currently used to verify animal welfare status. Consequently, literature has paid particular attention to the interpretation offered by the UK Farm Animal Welfare Council (FAWC) in 1993 ("the Five Freedoms"). This definition, despite being widely accepted, is nevertheless criticised for its largely anthropocentric vision (Webster, 2001; Korte *et al*., 2007). In particular, Webster (2001) emphasises that prevention and the protection of animals from potential states of suffering, rather than the utopian ideal in which all suffering is eliminated, is the prerequisite to ensuring animal welfare. In subsequently proposing "the Five Freedoms", the author incorporates the prevention of the animal's physical and mental exhaustion induced by intensive productive and reproductive activities. In attempting to propose how the FAWC principles should be converted into action, Webster (2001) defines resources and management as areas which the livestock farmer can control in order to ensure the welfare of his animals. Although the availability of adequate farming resources (feed, sanitation, quantity and quality of space) are certainly elements which correlate with most of the determining factors mentioned by the FAWC, of particular interest for this study is Webster's idea that the prevention of mental and physical exhaustion induced by intensive reproductive activity may be considered a managerial aspect which the breeder can use to promote

animal welfare. With specific reference to rabbit farming, it is necessary to underline that research primarily focuses on evaluating the impact which individual innovations have on animal welfare. In the majority of cases, these are technical innovations related to cage sizing and the improvement of husbandry conditions by enhancing the environment in which the animals are reared (Morisse *et al*., 1996; Morisse, 1999; Xiccato *et al*., 1999). A limited number of studies focus on evaluating the impact on animal well-being and business performance of organisational solutions for protecting the physiology of the animal, by preventing its physical and metabolic exhaustion as described by Webster (2001). Based on the above considerations, this study aims to evaluate the economic sustainability of adopting a less intensive insemination rhythm with a view to promoting animal welfare, as proposed by Castellini *et al*. (2006).

MATERIALS AND METHODS

The analysis is based on technical and economic information collated from three rabbit farms by means of in-depth interviews. The interviews were conducted with the help of a questionnaire to systematically detect general information about the business (location, cultivated area, management format and work unit), the rabbitry (average population, reproductive parameters of the maternity and growth sections), housing arrangements (cage type and dimensions, types of environmental control, waste management), management costs and capital used for running the operation. Two of the three livestock farms in the survey are located in the province of Padua, while the other is located in the province of Perugia. All three farms are directly operated by the owner and their family members, assisted by temporary workers. The average total farm area is 33 hectares, while the average number of does is 1,167 (Table 1).

Table 1: Technical and economic profile of farms

	Mean	St.Dev.
Total area (hectares)	33	27.2
Labour (ULU)[a]	3	2.6
Fixed assets (Euro)[(b)]	486,870	0.5
Average rabbit population		
- Bucks (n.)	58	0.3
- Does (n.)	1,167	0.5
- Nulliparous females (n.)	250	0.9
- Fattening animals (n.)	8,200	0.7
Rhythms and reproductive life of breeding animals		
- Duration of reproductive life (years)	2	0.1
- Average kindlings per year (n.)	7	0.1
- Kindling-to-mating interval (days)	11	0.0
- Kindling interval (days)	42	0.0
- Equalisation (kits/litter)	8	0.0
- Replacement rate (%)	83	0.4
- Fattening mortality (%)	5	0.4
- Fryers for slaughter (n.)	60,000	0.7
- Weight of fryers (g)	2,630	0.0
- Age of fryers sold (days)	80	0.1

Note: [(a)] Working Unit = 1,800 hours; [(b)] Animals capital, structure and equipment.

The parameters relating to the performance of does and fryers following the adoption of a less intense reproductive rhythm refer to the findings of research conducted by Castellini *et al*. (2006). In particular, it is considered that by extending the kindling-to-mating interval from 11 days to 32 days the following results may be obtained: reduction of fattening mortality from 5% to 2%; average sale weight of kit of 280 g; production of an average litter of 9 kits by breeding females. In order to evaluate the technical and economic sustainability of the innovation, quantities and costs of factors of production are referred to the year 2006, while the analysis of fryer sales prices for the period 2002-2007 refers to information contained in price lists issued by the Verona Commodities Exchange.

The methodological approach used in this study adheres closely to the research approach of the case study analysis. The findings, despite not being statistically representative, provide the reader with

points for reflecting on the potential impact of the given innovation on the economic sustainability of the rabbit farm. In fact the case studies analysis, which is widely used in academic fields such as sociology and psychology, has recently also generated growing interest in economic fields (Ghauri *et al*., 2002; Yin, 2003). For example, Stake (2000) asserts that this analytical approach is capable of "studying the detail", that is to say examining a specific subject in-depth. Yin (2003) asserts that, when conducting a case studies analysis, it is necessary to satisfy four conditions: construct validity, using multiple sources of evidence to collate detailed information on the subject of the analysis; internal validity, using shareable analysis criteria; external validity, ensuring the repeatability of the approach for the analysis of other case studies; reliability, in other words offering the possibility of defining a new analytical protocol to collect new data. In the case at hand, the construct validity of the analysis is guaranteed by the collation of detailed information from three rabbit farms. Internal validity is guaranteed by the use of accepted and established analytical techniques, such as production cost analysis (Moisello, 2000), cost-volume-profile analysis (CVP) (Horngren *et al*., 2005) and the analysis of isoprofit curves. Furthermore, the analysis protocol can be repeated in other livestock farms, thereby ensuring the repeatability and reliability of this analytical approach.

The analysis of the production costs of each livestock farm provided a starting point for both the CVP analysis and the definition of "pre" and "post" innovation isoprofit levels. Despite the inherent limitations in the CVP analysis hypothesis (Ray and Eric 2004), the determination of the break-even point, the margin of safety, the unit profit and the equilibrium price both before the innovation (ex-ante) and after the innovation (ex-post), made it possible to evaluate the impact of adopting less intensive insemination rhythms on the technical efficiency of the business. By contrast, the joint analysis of the producer's sales price trends and the ex-ante and ex-post isoprofit curves made it possible to verify the economic sustainability of the innovation.

RESULTS AND DISCUSSION

Consistently with other studies on the production cost of rabbit meat (Biagini *et al*., 2000), of a total of almost 1.7 euros/kilo sold, the most substantial components are feed (56%) and labour (20%). Less important are medicinal expenses, vets bills and fertilisation costs, which account for approximately 8% of the overall cost. The CVP analysis highlights how the adoption of an extensive insemination rhythm reflects positively on the technical efficiency of the farm (Table 2).

Table 2: Break-even point and economic aspects

Variables	Description	Ex -ante	Ex-post	Var.%
Qt	Quantity of meat sold (.000 kg)	159	175	10.03
BEP	Break-Even Point (.000 kg)	123	104	-15.63
Msic	Margin of Safety (%)	22.6	40.6	
Mcu	Unit contribution margin (Euro/kg)	0.59	0.70	18.53
Peq	Equilibrium price (Euro/kg)	1.67	1.51	-9.11

The Break-Even Point (BEP), which represents the minimal production level below which the business incurs a loss, is over 123,000 kg in the ex-ante situation, whereas by adopting the organisational innovation in question this threshold could be cut to 104,000 kg (-16%).

The margin of safety, which represents the maximum reduction in sales that a business can sustain before it makes a loss, is 41% in the ex-post situation, whereas in the ex-ante situation it is approximately 23%. A direct consequence of this improved performance is the reduction in the intrinsic risk of the activity. The innovation in question also appears to have a positive effect on the economic sustainability of the rabbit farm. Given the production levels achieved and presumed following the introduction of the innovation, the minimum sales price required to achieve a non-negative return (equilibrium price) falls from 1.67 to 1.51 euros per kilogramme. The net economic benefit per kilogramme of meat sold (unit contribution margin), which is generally reserved to cover the fixed costs incurred by the breeder regardless of the level of production obtained, improves markedly to 0.70 euros per kilogramme.

The joint analysis of average sale prices on the Verona market (Figure 1) and of isoprofit curves (Figure 2) provides us with indications about the economic sustainability of the production activity both before and after the adoption of a less intensive insemination cycle. In particular, it indicates how, given the same conditions (breeder's prices and production levels) the innovation in question is able to make the production activity more profitable. Assuming a sale price of 1.72 euros per kilo, the average profit is 9,000 euros in the ex-ante situation and 35,000 euros in the ex-post situation, corresponding to a unit profit for the breeder of 0.05 euros and 0.21 euros per kilogramme respectively.

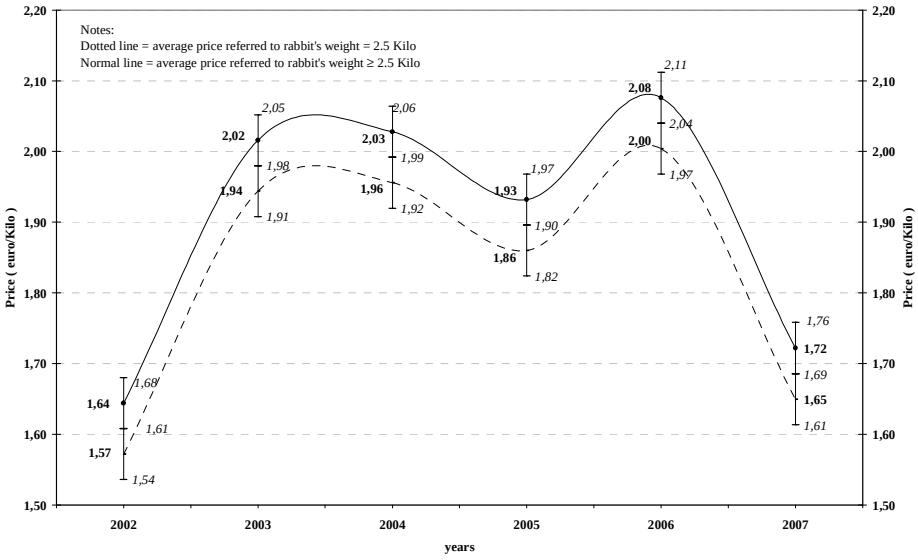

Figure 1: Average prices on the Verona market

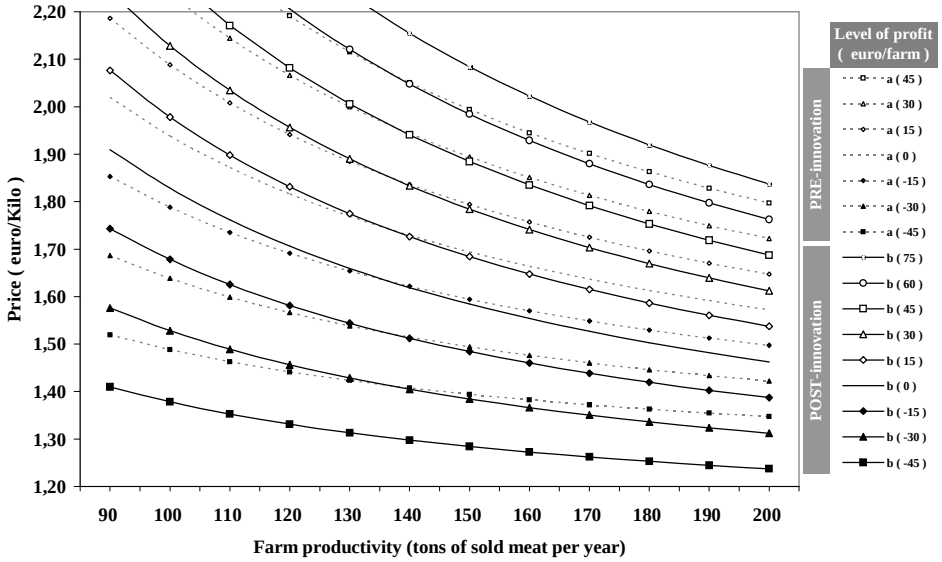

Figure 2: Isoprofit curves for different productivity levels and prices

CONCLUSIONS

In recent years, intensive livestock farming has attracted widespread public criticism, while growing awareness of animal welfare issues has led to important changes in European legislation. Not only do many of the interpretations offered on this theme approach animal welfare from a largely

anthropocentric viewpoint, the majority of studies focus on evaluating the impact that technical innovations - linked to animal population density, cage sizing and the enhancement of husbandry conditions - have on animal welfare. Although these determining factors significantly influence animal health, it should also be underlined that innovations aimed at preventing the animal's physical and mental exhaustion induced by intensive productive and reproductive activities are particularly significant for promoting animal welfare. Of all these innovations, the adoption of a less intensive reproductive rhythm is certainly a particularly interesting factor, since it respects the physiology of breeding does.

With reference to the study case, the adoption of this innovation demonstrates the possibility of favourable repercussions on the economic sustainability of the production activity, while enabling the rabbit farm to comply with the latest animal welfare guidelines.

REFERENCES

Agliati M. 2006. Budget e controllo di gestione. *Management, 5, 457-483, Il Sole 24 Ore, Milano, Italy.*

Biagini D., Lazzaroni C., Luzi F. 2000. Il costo di produzione della carne cunicola. *Riv. Coniglicoltura, 5, 22-28.*

Castellini C., Dal Bosco A., Cardinali R. 2006. Long term effect of post-weaning rhythm on the body fat and performance of rabbit doe. *Reprod. Nutr. Dev., 46, 195-204.*

Eurogroup 1995. Summary of Legislation Relative to Animal Welfare at the Level of European Community and Council of Europe. *Brussels: Eurogroup for Animal Welfare.*

Ghauri P., Grønhaug K. 2002. Research methods in business studies: A practical guide. *Pearson Education, Harlow England.*

Horgan R., Gavinelli A. 2006. The expanding role of animal welfare within EU legislation and beyond. *Livestock Science, 103, 303-307.*

Horngren C.T., Bhimani A., Foster G., Datar S.M. 2005. *Management and cost accounting, III ed., Prentice Hall Int.*

Jaedicke R.K., Robichek A. 1964. Cost–volume–profit analysis under conditions of uncertainty. *Accounting Review, 39(4), 917–926.*

Korte M.S., Olivier B., Koolhaas J.M. 2007. A new animal welfare concept on allostasis. *Physiology & Behaviour, 92, 422-428.*

Moisello A.M. 2000. I costi di produzione. Metodi e tecniche. *EGEA, Italy.*

Morisse J.P. 1999. Benessere animale: obiettivo prioritario. *Riv. Coniglicoltura, 1, 20-27.*

Morisse J.P., Maurice R. 1996. Influence of stocking density or grout size on behaviour of fattening rabbits kept under intensive conditions. *Applied Animal Behaviour Science, 54, 351-357.*

Ray H.G., Eric W.N. 2004. Programmazione e controllo. Managerial Accounting per le decisioni aziendali. *Mc Graw-Hill, Milano, Italy.*

Stake R. 2000. Case Studies. *In N. Denzin, Lincoln Y. (Eds) Handbook of qualitative research, Sage Publication Thousand Oaks, London, UK, 435-454.*

Webster A.J.F. 2001. Farm Animal Welfare: the Five Freedoms and Free Market. *The Veterinary Journal, 161, 229-237.*

Xiccato G., Verga M., Trocino A., Ferrante V., Queaque P.I., Sartori A. 1999. Influence de l'effectif et de la densité par cage sur les performances productives, la qualité bouchère et le comportement chez le lapin. *In: Proc. 8èmes Journ. Rech. Cunicole, Paris, France, 59-63*.

Yin R.K. 2003. Case Study Research – Design and Methods (Third Edition). *Sage Publication Thousand Oaks, London, UK.*