International Journal of Research Studies in Science, Engineering and Technology
Volume 5, Issue 7, 2018, PP 21-25
ISSN : 2349-476X

Measures to make a dairy farm profitable

António Moitinho Rodrigues[1,2,3*], Abel Veloso[1], Edgar Vaz[1]

[1]School of Agriculture - Polytechnic Institute of Castelo Branco, Qt.ª da Sr.ª de Mércules, 6001-909 Castelo Branco, PORTUGAL
[2]CERNAS / IPCB – Research Center for Natural Resources, Environment and Society / Polytechnic Institute of Castelo Branco
[3]International Farm Comparison Network (IFCN) research partner.

***Corresponding Author:** António Moitinho Rodrigues, School of Agriculture - Polytechnic Institute of Castelo Branco, Qt.ª Sr.ª Mércules, 6001-909, Castelo Branco, Portugal.*

ABSTRACT

As a result of milk prices crisis it is necessary to present some ideas which may contribute to the overcoming the present difficulties of Portuguese dairy farmers. First of all it is necessary to reduce milk production costs to improve dairy farm profitability. This reduction of milk production costs could be achieved by a decrease in feed costs (forage and other feed produced in the dairy farm should be used instead of forage or concentrate purchased-off dairy farm), using a frequent control of farm profitability (milk/feed price ratio) and average days in milk (should be between 150 and 170 days), promoting the improvement of reproductive parameters (heifers first service at 22-24 months of age, average farm of artificial inseminations per conception should be ≤1.7, mean time between calvings should be ≤395 days), promoting the milk quality (somatic cell less than 200,000 cells/mL), using crossbreeding dairy cows and promoting specialized technical support to interpret and apply the data given by the technological resources currently available.

Keywords: *dairy farm profitability, days in milk, feed costs, milk quality*

INTRODUCTION

Because of low milk prices, Portuguese dairy farmers continue to be at the bottom of Europe in terms of the economic value given to the milk. According to MMO (2018) data the mean price paid to Portuguese dairy farmers in December 2017 was 32.30 €/100 kg, which represents a very low value, only overtaken by the prices paid to Bulgarian (32.29 €/100 kg), Lithuanian (32.23 €/100 kg) and Romanian (31.97 €/100 kg) dairy farmers.

The "milk price crisis" that Portuguese farmers endure have been imputed to the decrease of Portuguese per capita milk consumption (-2.4% per year, between 2005 and 2015) reaching 70.7 kg/inhabitant/year in 2015 (INE, 2017). Also the economic difficulties felt by countries where the economy is strongly dependent on oil prices, such as Angola, affected the export of Portuguese dairy products and contributed for milk crisis (Rodrigues, 2016).

Technical efficiency of Portuguese milk producers is one of the highest in Europe and it has been calculated between 60 and 70% (Hallam and Machado, 1996). Xuegin et al. (2012) investigated technical efficiency changes of specialized German, Dutch and Swedish dairy farms between 1995 and 2004 and they found mean values of 61.4%, 55.3% and 78.8% respectively. For the year 1996, they found technical efficiencies of 57.5%, 47.2% and 83.8%, respectively for German, Dutch and Swedish farms. In both studies (Hallam and Machado, 1996; Xuegin et al., 2012), farm efficiency was positively correlated with the farm size but not with the degree of dairy farm specialization.

In Portugal, milk producers have been introducing adaptation strategies in face of this current difficult situation. Some examples of the improving measures that have been taken are the increase of the number of milking cows per farm, genetic improvement and enhancement of the comfort and health of the animals. In times of strong world milk price fluctuation and exchange rates, all dairy sector should be able to react quickly to the menaces and to anticipate the opportunities. It will be crucial to invest in the development of new products, in products that increases the added value and in the search for new markets. Only in this way it will be

possible for the Portuguese dairy industry to sell the milk products more easily and pay a better price to the dairy farmers. According to Medeiros (2018), the milk produced in Portugal has high standard of quality (fat 3.9%; protein 3.2%, urea 235 ppm; microorganisms 60,000 CFU; SCC 280,000 cells/mL).

OUR OBJECTIVES

On this paper we present some measures that could be adopted by dairy farmers to improve the profitability of their farms, overcoming the present difficulties felt by Portuguese dairy farmers.

COW FEEDING

Cow feeding has a strong impact in the milk production costs. Total feed costs to produce 1 kg of milk represent about 56.7% to 71.3% (Baptista et al., 2012) or 59.3% to 78.4% (Sottomay or et al., 2012) of the total production cost. It is necessary to feed cows with feedstuff that increase milk production at the minimum feed cost. With this aim we propose that forage and other feed produced in the dairy farm should be used instead of forage or concentrate purchased off-farm. In fact, some studies have shown that farms which use high levels of concentrate for milk production are the most sensitive to the increase on the raw materials price in the international market (Alqaisi et al., 2011).

Dairy farms profitability is related to milk / feed price ratio. According to Schröer-Merker et al. (2012), milk / feed price ratio is defined as milk price divided by the price of purchased feed and can be used as a measure of dairy farm profitability. In a simplified form, this indicator shows how much feed a farmer can buy after selling 1 kg of milk and has been defined as "very unfavorable" if lower than 1, "unfavorable" if lower than 1.5, "favorable" if higher than 1.5 and "very favorable" if higher than 2.

DAYS IN MILK

The productive parameter days in milk (DiM) should be between 150 and 170 days (Figure 1).An increase of DiM value has a negative effect on the average daily milk production. This parameter is easy to obtain in a quick visit to the dairy farm and gives a picture of cow's productive and reproductive situation (Rodrigues et al., 2012). A higher average value of DiM means that the average daily milk production in the dairy farm is lower than it should be. It means that the average interval between calving and conception is greater than 90 days which will imply a delay on the cow dry off with the consequent deviation of average farm milk production to the right of the curve (Figure 1).

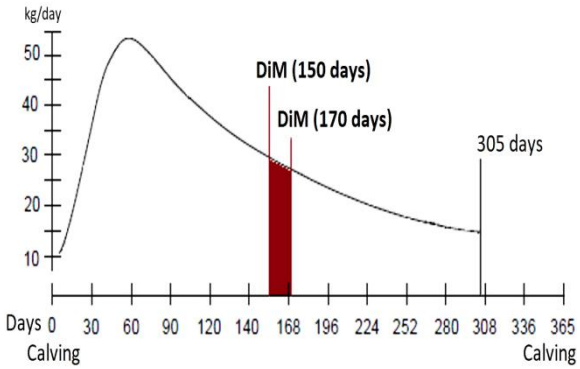

Figure 1. *Ideal average Days in Milk (DiM) in a dairy farm (150 to 170 days) (adapted from Rodrigues et al., 2012).*

Dairy cows should have a high longevity and more numerous and persistent lactations.

REPRODUCTIVE EFFICIENCY

Reproduction results continuously declined for last 30-40 years (Beran et al., 2013) and fertility in dairy cattle has an important effect on herd economics. The main reason of poor fertility is assume to be negative energy balance evoking body reserves mobilization to meet the increased nutrient demand for milk yield. Because of the fertility, the number of cows that yielded milk significantly longer than 305 days of lactation has markedly increased in recent years (Duchacek et al., 2014).

In order to improve productive efficiency of dairy farms, heifers should calve at an early age. To achieve heifers first service at an ideal age (13-15 mouths), allowing first calving at 22-24 months (Ribas, 1997), it is necessary to promote 0.7 to 0.9 kg daily weight gain from birth to 13-15 months of age. At first service, heifer weight should be 55% of its adult weight. The growth of the mammary gland is a complex process which can be affected by nourishment. After 2-3 months and until 9-11 months old, allometric growth of the mammary gland is quicker than body growth. An excessive daily weight gain until puberty could be related to an increase of fatty tissue in the mammary gland, a decrease in parenchymal tissue and a lower first lactation milk production (Hoffman, 1997).

The number of artificial inseminations per conception should be equal or less than 1.7 (Keown and Kononoff, 2006) and the mean time between calving should be always less than 395

days. Higher values may have a negative impact on the dairy farm profitability.

MILK QUALITY

Mastitis is one of the most frequent, complex and costly diseases of dairy cattle. Once inflammation occurs, synthetic activity of mammary gland decreases and milk constituents

change with negative implications on the milk productions costs and farm profitability. The bonus paid to the dairy farmers by milk processors decreases when somatic cells counts (SCC) increases. Mastitis is also a cause of hidden costs which, despite being overseen by the farmer, reduce daily milk production (Hagnestam-Nielsen et al., 2009) (Table 1) and its total solids as a consequence of epithelial secretor tissue destruction by microbial toxins and enzymes (Bruckmaier et al., 2004).

In both primiparous cows and multiparous cows, an increase of SCC above 100,000 cells/mL causes a decrease in daily milk production. This reduction in milk production is even more evident at the final stage of lactation (Table 1).

CROSSBREEDING

The Holstein Friesian breed is the most numerous breed in dairy production all around the world and have benefited from improvement in type through selection over the past 40 years. In this breed the pressure of genetic improvement has increased family relationship between cows. In most cases, there is no control of family relationship between male and female when a Holstein Friesian cow is inseminated. By inseminating always the best cows with the best bulls, inbreeding is increasing in purebred Holstein Friesian populations. This fact negatively affects the reproductive parameters and cow's health and longevity as a consequence of inbreeding depression.

Table1. *Absolute milk yield (kg) at various somatic cells counts (SCC) (× 103 cells/mL), expressed as deviation from the amount of milk produced given an SCC of 175,000 or 200,000 cells/mL in lactation wk 1 (primiparous and multiparous cows, respectively), and an SCC of 50,000 cells/mL in later lactation (Hagnestam-Nielsen et al., 2009).*

Week in lactation							
SCC	1	2	3 to 8	9 to 16	17 to 24	25 to 32	33 to 44
Primiparous cows							
100	NA	−0.5	−0.3	−0.4	−0.3	−0.5	−0.6
200	−0.1	−1.0	−0.5	−0.7	−0.7	−1.0	−1.2
500	−0.7	−1.6	−0.9	−1.2	−1.3	−1.6	−2.0
1,000	−1.2	−2.1	−1.1	−1.6	−2.0	−2.1	−2.6
Multiparous cows							
100	NA	−0.4	−0.4	−0.4	−0.6	−0.9	−1.1
200	NA	−0.9	−0.7	−0.8	−1.1	−1.7	−2.2
500	−1.1	−2.0	−1.4	−1.6	−2.1	−2.9	−3.7
1,000	−2.1	−3.1	−2.1	−2.5	−3.1	−3.8	−4.8

NA = not applicable.

Dairy farmers that aim for the best profit could find advantages in crossbreeding, which is a strategical method that could turn milk production into a more profitable and sustainable activity by improving the fertility, the health and the longevity of the cows. The term used for crossbred performance relative to the parent average is "hybrid vigor" or "heterosis". Table 2 shows population sizes and production of potential breed resources for crossbreeding programs. Holstein breed is at the base of the crossbreeding based on a rotational programs with 2 or 3 specialized milk breeds. By improving fertility, calving ease, longevity and milk component percentages, we are decreasing milk production costs and helping to secure the economic success of the farm.

SPECIALIZED TECHNICAL SUPPORT

As in other EU countries, specialized technical support is more and more necessary in Portuguese dairy farms. Technical support should be seen as an investment in the future of the farm and not as a cost. In fact, it allows the producer to make a better use of the information delivered by the organizations that lead the milk control. For instance, milk recording defines objective criteria which ease the task of selecting the cows to cull each year, guide the choice of the best bull for artificial insemination of each cow and facilitates the choice of heifers for replacement.

Besides that, the information given to farmers (somatic cells count, milk urea, milk keton

bodies…) makes the task of decision easier and helps to reduce production costs.

Table2. *Population sizes and production of potential breed resources for crossbreeding programs. Management conditions are not the same for all breeds and could affect production comparisons.*

Breed	Worldwide population	Bulls sampled per year	Average milk (kg)	Fat (%)	Protein (%)
Ayrshire	100,000	150	8,100	3.9	3.1
Holstein	25,000,000	4,000	10,600	3.6	3.0
Jersey	1,200,000	630	8,000	4.6	3.6
Brown Swiss	7,000,000	80	9,400	4.0	3.3
Normande	300,000	160	7,300	4.4	3.6
Montbeliarde	330,000	170	8,200	3.8	3.4
Swedish Red	205,000	100	9,000	4.2	3.5

Source: *Dairy Herd Management, April 2005.*

Also pregnancy diagnosis (by pregnancy-associated glycoprotein analysis), milk casein quantification (α-s1, α-s2, β, k, γ) and milk fatty acids composition will become important tools for the dairy farmer. Milk casein and milk fatty acids composition will be especially helpful for the valorisation of the milk intended for cheese and yogurt production, because of its relationship with caseins, or for the production of highly nutritional quality milk (with a highly content of conjugated-linoleic fatty acid and mono-unsaturated and poly-unsaturated fatty acid) (Rodrigues, 2016).

CONCLUSIONS

Because of low milk prices, Portuguese dairy farms must reduce the production costs. This reduction could be achieved by a decrease in feed costs, a frequent control of farm profitability, the improvement of reproductive parameters, the improvement of milk quality, the use of crossbreeding dairy cows and the use of high specialized technical support to interpret and apply the data given by the technological resources available.

REFERENCES

[1] Alqaisi O, Steglich J, Ndambi A and Hemme T : Feeding systems: an assessment of dairy competitiveness. In Chapter 4 – Special studies. Edited by Torsten Hemme. Schauen burgerstrate, Germany: IFCN Dairy Research Center; 2011:174-175.

[2] Baptista F, Murcho D, Silva LL, Marques C. Energy efficiency measures in Portuguese Dairy Cows production. In Economic and environmental analysis of energy efficiency measures in agriculture. Case Studies and trade offs. AGREE Project Deliverable 3.1. Edited by Meyer-Aurich et al. 2012:58-62.

[3] Beran J, Stadnik L, Duchacek J, Okrouhla M, Dolezalova M, Kadlecova V, Ptacek M. Relationships among the cervical mucus urea and acetone, accuracy of insemination timing, and sperm survival in Holstein cows. Animal Reproduction Science. 2013; 142(1-2): 28-34.

[4] Bruckmaier RM, Ontsouka CE, Blum JW. Fractionized milk composition in dairy cows with subclinical mastitis. Veterinary Medicine-Czech.2004; 8: 283-290.

[5] Duchacek J, Beran J, Ptacek M, Stadnik L. Influence of breed, parity and body condition change on reproductive performance of dairy cows. Reproduction in Domestic Animals. 2014; 49: 66-66.

[6] Hagnestam-Nielsen C, Emanuelson U, Berglund B. Strandberg E. Relationship between somatic cell count and milk yield in different stages of lactation. Journal of Dairy Science. 2009; 92: 3124-3133.

[7] Hallam D, Machado F. Efficiency Analysis with Panel Data: A Study of Portuguese Dairy Farms. European Review of Agricultural Economics. 1996; 23: 79-93.

[8] Hoffman PC. Optimum body size of Holstein replacement heifers. Journal of Animal Science. 1997; 75(3): 836-845.

[9] INE 2017. Estatísticas da produção e consumo de leite 2016. Lisboa, Portugal: Instituto Nacional de Estatística, I.P., 2017.

[10] Keown JF, Kononoff PL. Putting a price on reproductive losse. Dairy Cattle Reproduction Council Neb Guide. 2006.

[11] Medeiros L. Evolução da qualidade do leite de vaca cru em Portugal Continental. In: Livro de Comunicações VII Jornadas Internacionais de Bovinicultura; 2018 Mar 16-17; Vila Real, Portugal.

[12] MMO. European milk market observatory – EU historical prices. 2018. Available at http://ec.europa.eu/agriculture/milk-market-observatory/index_en.htm (last accessed 01-03-2018).

[13] Ribas, JB. Programa de alimentação e desenho de arraçoamentos em vacas leiteiras. Revista Portuguesa de Buiatria. 1997; 1(2): 21-34.

[14] Rodrigues AM. A gestão de uma exploração leiteira em Portugal face ao mercado internacional de lácteos. Produtores de Leite, Revista da APROLEP. 2016; VII(13): 12-14.

[15] Rodrigues AM, Guimarães J, Oliveira C. Rentabilidade das explorações leiteiras em Portugal - dados técnicos e económicos. Livro de Resumos V Jornadas de Bovinicultura; 2012 Mar 30-31; Vila Real, Portugal.

[16] Rodrigues AM, Vouzela C, Marques N. Índice VL, uma ferramenta útil para a bovinicultura leiteira. Ruminantes. 2013; 3(11): 42-43.

[17] Schröer-Merker E, Wesseling K, Nasrollahzadeh M. Monitoring milk: feed price ratio 1996-2011. In Chapter 2 – Global monitoring dairy economic indicators 1996-2011. Edited by Torsten Hemme.

[18] Schauenburgerstrate, Germany: IFCN Dairy Research Center; 2012:52-53.

[19] Sottomayor M, Costa L, Ferreira MP. Impacto da Reforma da PAC Pós - 2013 no Setor do Leite em Portugal - Relatório 6.07.2012. Universidade Católica Portuguesa, 2012.

[20] Xueqin Z, Demeter RM, Lansink AO. Technical efficiency and productivity differentials of dairy farms in three EU countries: the role of CAP subsidies. Agricultural Economics Review. 2012; 13(1): 66-92.

Citation: *António Moitinho Rodrigues, Abel Veloso, Edgar Vaz" Measures to Make a Dairy Farm Profitable",International Journal of Research Studies in Science, Engineering and Technology, vol. 5, no. 7, pp. 21-25, 2018.*