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Letter to Editor

Repeat breeding syndrome in dairy cows: is it luckily being solved by itself?

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Dear Editor,

The dairy industry has witnessed a significant drop in the number of small and average-sized dairy farms not only in Iran (personal observations and communications) but also in other countries, including the UK (Kimura and Sauer, 2015; Jones, 2020), Europe (Bijttebier *et al*., 2017), Australia (Frilay *et al*., 2018), India (Jatwani and Swain, 2020), and the USA (Njuki, 2022) in recent years. Small and average-sized Iranian dairy farms, in particular, faced many challenges, including the paralyzing rise in feed costs, low prices of milk, shortage of high-quality feeds, poor infrastructures, and lack of helping financial resources in the last decade. In addition, the prolonged drought in some regions of the world including Iran has accelerated the vulnerability of the farming and dairy industry. The vulnerability and economic loss seem to be greater for the closed dairy systems, not dependent on the pasture feeding. In particular, those farmers who do not own land to cultivate forage are inevitably dependent on getting supplied by the runaway train of daily forage market. Other global issues such as the production of greenhouse gases from animal agriculture have particularly imposed more pressure on the dairy industry. Food and agricultural organization estimated that livestock farming is responsible for about 14.5% of total anthropogenic greenhouse gas emissions (Gerber *et al*., 2013). The occurrence of drop in the number of small dairy farms in the USA over the last two decades is an example of such an event. In 1997, small dairy farms (10-199 cows) had 56.3% of the total milk cows in the USA, while large dairy farms (at least 1,000 cows) held about 17.5% of all milk cows. Two decades later, the number of small dairy farms fell by 66%, and then these farms shared all milk cows to only 21.6% (Njuki, 2022). In the meantime, the number of large farms increased by more than 100%. In 2017, the large dairy farms reared 55.2% of all milk cows in the USA (MacDonald, USDA report, 2020). The scale economies in many parts of the world (Kimura and Sauer, 2015; Jatwani and Swain, 2020) provide advantages to large dairy farms. On average, larger dairy farms have lower production costs than smaller farms (De Vries and Marcondes, 2020). In addition to the significant decrease in the number of small- and average-sized dairy farms in the past few years, we have also witnessed a not-easily returnable fall in the number of high-producing dairy cows. Many dairy cows, including fertile or infertile high genetically merit ones, were inevitably sent to the slaughterhouse, albeit not permitted by the Iranian Veterinary Organization, mainly due to economic pressures. The small and average-sized dairy farms are more financially damaged when face with an unacceptable incidence of reproductive failures such as repeat breeding (RB) syndrome in cows.

Reproductive failures, including RB syndrome, possess the first rank of culling rates in many dairy herds around the world (Ansari-Lari *et al*., 2010; Kalantari *et al*., 2010; Armengol and Fraile, 2018; Golestani *et al*., 2018; De Vries and Marcondes, 2020). While diagnosing the cause of bovine abortion is the most difficult and non-rewarding task for bovine practitioners in the world, the second most challenging but rewarding task is certainly the diagnosis of the cause(s) and successful treatment of RB syndrome in dairy cows. RB cows do not conceive after at least three consecutive breeding attempts (Yaginuma *et al*., 2019). The RB syndrome appears in two types: “early repeats” and “late repeats”. If embryo mortality occurs before maternal recognition of pregnancy, cows will be in heat in 18 to 22 days after breeding which is named “early repeats” (López-Gatius and Garcia-Ispierto, 2020). The “late repeats” however is seen when the embryo mortality occurs after the maternal recognition of pregnancy, then these cows return to heat in more than 25 days after breeding. Due to the higher rate of embryo loss that occurs during the first estrous cycle after breeding, “early repeats” is more common than “late repeats”. However, the more harmful type of RB is “late repeats” considering possible low estrus efficiency in some dairy herds. The misleading scenario in maintaining these cows in the herd is to decide solely on the number of unsuccessful breeding attempts. To better estimate the real economic loss, it is important to consider the summation of days that RB

cows remain open. The incidence of RB cows has been reported from 10 to 40% based on the case definitions and herd differences in dairy farms in different parts of the world. The etiology is multifactorial and may include uterine infections, hormonal imbalances, nutritional factors, genetic causes and generally speaking, mis-management. The body condition score of many RB cows increases as they remain open and ultimately get fat at the fifth (or so) breeding attempts. The cows that become pregnant in their late lactation period will most probably be a candidate to be culled in the next lactation due to an increased risk of metabolic disorders in their next peri-calving period (De Vries and Marcondes, 2020). Uterine infections are of utmost importance to result in the occurrence of repeat breeding syndrome in dairy cows. A case of metritis resulted in an increase in days open (16.4 ± 1.2) and number of insemination (0.1 ± 0.0) per conception (Mahnani *et al*., 2015). Further, these authors estimated that each case of metritis costs from $146.4 to $175.7 with a mean of $162.3 in dairy farms in Iran. Now, can the farmer keep RB cows to get pregnant any way one day considering the paralyzing rise in the feed costs and the related-economic losses? This question has been convincingly answered by dairy economists: not-economic to keep RB cows particularly "late repeats" most probably for the third and undoubtedly for the forth breeding attempts unless otherwise the milk production per case of RB is profitable enough. From an economic standpoint, extending productive lifespan does not necessarily increase profitability per cow per year (De Vries and Marcondes, 2020). Notwithstanding the forgoing, some dairy farmers even under present hard economic situation may unknowingly or constrainedly keep RB cows for a longer period in the herd. Small and some average-sized dairy farms are economically more vulnerable when facing cows with reproductive failures. Under many different circumstances, these farms cannot afford the costs involved and soon have to exit from the dairy industry.

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