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*Original article*

# INCIDENCE OF DIFFERENT TYPES OF DYSTOCIA IN DIFFERENT SEASONS OF THE YEAR AND PARITIES IN IRANIAN HOLSTEIN DAIRY COWS

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**Summary**

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Dystocia (DYS) is an important problem in Holstein cattle and imposes important economic losses on cattle producers. The etiologies and types of DYS are various and different factors can influence its incidence. In the present study, incidence of different types of dystocia was investigated in different seasons and parities in Holstein cows. One hundred and eighty two primi- and multiparous cows with DYS were included in the study. The results showed significantly more calf births in anterior presentation to first-calf heifers compared to those born to cows in parities 2–3 or ≥ 4 ($P \leq 0.05$). There was no significant difference in the number of calves born in anterior presentation between cows in parities 2–3 and those in parities ≥4 ($P > 0.05$). Also, significantly more dystocia cases were encountered in first-calf heifers compared with those in cows in parities 2–3 or ≥4 ($P \leq 0.05$) but there was no significant difference in this regard between the cows in parities 2–3 and those in parities ≥4 ($P > 0.05$). In addition, the results revealed that DYS due to foetopelvic disproportion (FPD) mostly affected the primiparous cows and that the multiparous cows were mostly affected by dystocia due to twin birth (TB), uterine inertia (UI) and uterine torsion (UT). Moreover, the results showed that significantly most DYS cases occurred during winter compared with spring, summer or autumn ($P \leq 0.05$), of which the majority was due to FPD. On the other hand, the least DYS cases were observed in summer months, of which the majority was again due to FPD. Finally, there was no significant difference in the overall incidence of dystocia between spring, summer and autumn ($P > 0.05$).

**Key words**: dystocia, Holstein cows, parity, season

## INTRODUCTION

Calving difficulty or dystocia (DYS) is an important problem in Holstein cattle; about one birth of every 5 to first-parity dams "need assistance" (Meyer *et al.*, 2001). DYS has been defined as a difficult birth resulting in prolonged calving or severe assisted extraction of the calf at birth but assisted calving has been defined as a birth in which assistance is required (e.g., correction of malposition), but this

may not necessarily result in DYS (Mee, 2004). According to Sasaki *et al.* (2014), DYS is a calving that requires veterinary assistance. Others have defined DYS as births that were reported as requiring considerable force or extremely difficult for calving difficulty score rated on a 1 to 5 scale (Norman *et al.*, 2010).

DYS can result from the failure of expulsive forces during parturition, birth canal inadequacy, foetal malposition, disproportionate calf size to the dam's pelvic size (Noakes *et al.*, 2009), twins, and uterine torsion (Mee, 2008). Abnormally short or long gestation length, and overfeeding or underfeeding in the last trimester can increase the risk of DYS (Proudfoot *et al.*, 2009). In primiparous cows, an important or actually the most important factor is the relationship between the calf size and the size of the birth canal (Lombard *et al.*, 2007; Mee, 2008; Mee *et al.*, 2011; Schuenemann *et al.*, 2011). Calf birth weight has been identified as one of the most significant risk factors for the occurrence of DYS in heifers and pluriparous females (Micke *et al.*, 2010). Vulval stenoses have also been mentioned to be one of the most frequent causes of DYS in primiparous dams (Mee, 2008), whereas foetal malpresentation or maternal-related causes (*e.g.* uterine torsion, hypocalcaemia, cervical stenosis) are the most frequent causes of DYS in multiparous dairy cows (Lombard *et al.*, 2007; Mee, 2008). DYS rate can be up to three times greater in primiparae compared to that in pluriparae (Meyer *et al.*, 2001). Weak labour can be the cause as well as a consequence of a difficult calving. Primary weak labour is reported to be most frequent in older cows, possibly often associated with milk fever (Meijering, 1984) or hypocalcaemia (Schuenemann *et al.*, 2011). Insufficient dilatation of the cervix and uterine torsion may contribute significantly to the incidence of severe DYS, especially in older cows (Meijering, 1984). The increase in calving assistance and DYS at twin calvings has been attributed to abnormal presentation, increased number of dead calves, the total weight of calves born and uterine inertia (Lombard *et al.*, 2007).

It has been shown that parity is a large contributor to calving difficulty although effects of parity were probably due to physical maturation, including increased pelvic dimensions (Nix *et al.*, 1998). These authors reported that birth weight and parity of dam had the greatest influence on DYS. Cold weather during the last trimester has been associated with increased dry matter intake, increased thyroid hormone concentration, increased blood and nutrient flow to the uterus, increased gestation length and reduced plasma oestradiol concentrations leading to increased birthweight and DYS (Mee, 2008).

The month of calving is also shown to influence DYS frequency. High incidence of DYS was found in autumn and winter with peaks in December and a decrease from February to May (Osinga, 1978).

To the author's knowledge there is no study on the incidence of different types of DYS in different parities of dams and seasons of the year and the relationship between them in Iranian Holstein cows. So, these parameters were investigated in the present study.

## MATERIALS AND METHODS

### *Animals and location*

The study was conducted in Urmia (altitude 1,332 m above sea level; 37°33′19″N, 45°04′21″E; with cold winters, mild springs, hot dry summers and cool autumns; coldest – 2.6 °C and hottest – 31.2 °C average temperature in June and

July, respectively), the capital city in West Azarbayejan province, Iran. A total of 182 primi- and multiparous Iranian Holstein cows that could not deliver their foetuses at least two hours after the beginning of the second stage of the labour at their natural spontaneous calving events were considered as suffering from DYS and included in the study. All dystocic cows were examined and treated personally. The cows were non-seasonal, year-round calvers, kept in confinement, fed a mixture of food consisting of alfalfa hay, chopped straw, grass and commercial concentrate and milked twice daily. Parity ranged from 1 to 9. All cows had been artificially inseminated with frozen-thawed semen of proven sires by AI technicians after being detected in standing estrus.

*Data collection*

Data including causative factors for dystocia – deviation of foetal head (DFH), foetal limb malposture (FLM), foetal malposition (FMP), foetopelvic disproportion (FPD), foetal malpresentation (MPR), twin birth (TB), uterine inertia (UI), uterine torsion (UT), parity of the dams (1, 2–3, ≥4) and calving season were recorded for final assessment.

*Statistical analysis*

Pearson Chi-Square test (SPSS, Version 23, Chicago, IL, USA) was used to evaluate the differences in the incidences of DYS types in different parities of the dams; DYS types in different seasons of the year; and anterior or posterior presentation in different parities of the dams suffering from DYS. Statistical level of significance was set at $P \leq 0.05$.

## RESULTS

The number and percentage of anterior and posterior presentation of calves born

**Table 1.** Relationship between dam parity and calf presentation in Holstein cows suffered from dystocia (n=182)

| | Dam parity | | | |
|---|---|---|---|---|
| | 1 | 2–3 | ≥ 4 | Total |
| *Anterior calf presentation* | | | | |
| count | 95 | 30 | 37 | 162 |
| % within presentation | 58.6 | 18.5 | 22.8 | 100.0 |
| % within parity | 94.1[a] | 85.7[a,b] | 80.4[b] | 89.0 |
| % of total | 52.2 | 16.5 | 20.3 | 89.0[a] |
| *Posterior calf presentation* | | | | |
| count | 6 | 5 | 9 | 20 |
| % within presentation | 30.0 | 25.0 | 45.0 | 100.0 |
| % within parity | 5.9 | 14.3 | 19.6 | 11.0 |
| % of total | 3.3 | 2.7 | 4.9 | 11.0[b] |
| *Total* | | | | |
| count | 101 | 35 | 46 | 182 |
| % within presentation | 55.5 | 19.2 | 25.3 | 100.0 |
| % within parity | 100.0 | 100.0 | 100.0 | 100.0 |
| % of total | 55.5 | 19.2 | 25.3 | 100.0 |

[a,b] Different superscript letters within a row or column denote significant difference.

to Holstein cows with different parities that suffered from DYS is presented in Table 1. The results of the statistical analysis demonstrated a significant difference in the incidence of anterior or posterior presentation in calves born to primiparous cows compared to those born to cows with parity ≥4 ($P<0.05$). In other words, more calves were born in anterior presentation to first-calf heifers in comparison to those born in anterior presentation to cows with parity ≥4 (Table 1). However, there were no significant differences in the number and percentage between calves born in anterior or posterior presentation to cows with parity 1 and 2–3 or between those born in anterior or posterior presentation to cows with parity 2–3 and ≥4 ($P\geq0.05$).

Table 2 presents the distribution of different types of DYS in Holstein cows with different parities. The most frequent type of DYS observed was that due to FPD. On the other hand, the least frequent type of DYS encountered was that caused by MPR with only one case. The other observed types of DYS in descending order were DFH, FLM or UI, TB, FMP and UT (Table 2). In addition, the results of the present study revealed that DYS due to FPD most often affected the primiparous Holstein dairy cows (n=62, 79.5%) and that the multiparous cows were much less affected by FPD compared to the first-calf heifers. Also, the results demonstrated that half of the cows affected by DYS due to UI were among the cows with parity ≥4. Moreover, the results showed that the majority of twin births took place among cows with parity ≥4 (85.7%).

Table 3 presents the seasonal distribution of different types of DYS in Holstein dairy cows. As shown, most DYS cases occurred in winter months in comparison to other seasons, of which the majority was due to FPD (n=27, 15.3%). The incidence of difficult births in autumn months was lower than that occurringd in winter months but higher than that seen in spring or summer months. On the other hand, the least DYS cases were observed in summer months (17.6%), of which the majority was due to FPD (Table 3).

## DISCUSSION

It has been suggested that normal presentation may be defined as anterior presentation, dorsal position, and the foetal head resting on fully extended forelegs and that any presentation, position, or posture deviating from this description was classified as a malpresentation (Holland *et al.*, 1993). However, malpresentation including posterior dorsal presentation with extended hind limbs at birth has generally not been considered to be a significant factor contributing to DYS. Most researchers have considered malpresentation to be negligible and random in nature and, as such, have often omitted these births from analysis (Nix *et al.*, 1998). So, in the present study, posterior presentation was considered normal and not included in the study unless there was a situation such as a mismatch between the calf size and the dam's pelvic area, retention of a hind limb, a breech presentation, a malposition, and so on, in which giving assistance in order to deliver the calf was unavoidable. Overall, among the calves needing assistance for delivery 11% (20 calves) were born in posterior presentation, the majority of which were born to cows in parities ≥4. In the current study, only one ventrotransverse presentation (0.6% of total births) was encountered, which is regarded to be rare in cattle and may be the

**Table 2.** Distribution of types of dystocia (%) in Holstein dairy cows with different parities (n=176)

| Cause of dystocia | | Dam parity | | | Total | |
|---|---|---|---|---|---|---|
| | | 1 | 2–3 | ≥ 4 | count | % of total |
| Deviation of foetal head | count | 15 | 8 | 7 | 30 | 17.0 |
| | % within parity | 15.0 | 22.2 | 17.5 | | |
| | % within DYS* | 50.0 | 26.7 | 23.3 | | |
| Foetal limb malposture | count | 12 | 6 | 7 | 25 | 14.2 |
| | % within parity | 12.0 | 16.7 | 17.5 | | |
| | % within DYS | 48.0 | 24.0 | 28.0 | | |
| Foetal malposition | count | 3 | 1 | 2 | 6 | 3.4 |
| | % within parity | 3.0 | 2.8 | 5.0 | | |
| | % within DYS | 50.0 | 16.7 | 33.3 | | |
| Foetopelvic disproportion | count | 62 | 13 | 3 | 78 | 44.3 |
| | % within parity | 62.0 | 36.1 | 7.5 | | |
| | % within DYS | 79.5 | 16.7 | 3.8 | | |
| Foetal malpresentation | count | 0 | 1 | 0 | 1 | 0.6 |
| | % within parity | 0.0 | 2.8 | 0.0 | | |
| | % within DYS | 0.0 | 100.0 | 0.0 | | |
| Twin birth | count | 1 | 0 | 6 | 7 | 4.0 |
| | % within parity | 1.0 | 0.0 | 15.0 | | |
| | % within DYS | 14.3 | 0.0 | 85.7 | | |
| Uterine inertia | count | 5 | 7 | 12 | 24 | 13.6 |
| | % within parity | 5.0 | 19.4 | 30.0 | | |
| | % within DYS | 20.8 | 29.2 | 50.0 | | |
| Uterine torsion | count | 2 | 0 | 3 | 5 | 2.9 |
| | % within parity | 2.0 | 0.0 | 7.5 | | |
| | % within DYS | 40.0 | 0.0 | 60.0 | | |
| Total | count | 100 | 36 | 40 | 176 | |
| | % of total | 56.8[a] | 20.5[b] | 22.7[b] | | 100.0 |

[a,b] Different superscript letters in a row denote significant difference.

**Table 3.** Seasonal distribution (%) of different types of dystocia in Holstein dairy cows (n=176)

| Cause of dystocia | | Season of the year | | | | Total | |
|---|---|---|---|---|---|---|---|
| | | Spring | Summer | Autumn | Winter | count | % of total |
| Deviation of foetal head | count | 3 | 5 | 10 | 12 | 30 | |
| | % within season | 7.9 | 16. 1 | 23.8 | 18.5 | | |
| | % within DYS | 10.0 | 16.7 | 33.3 | 40.0 | | |
| | % of total | 1.7 | 2.8 | 5.7 | 6.8 | | 17.0 |
| Foetal limb malposture | count | 6 | 3 | 7 | 9 | 25 | |
| | % within season | 15.8 | 9.7 | 16.7 | 13.8 | | |
| | % within DYS | 24.0 | 12.0 | 28.0 | 36.0 | | |
| | % of total | 3.4 | 1.7 | 4.0 | 5.1 | | 14.2 |
| Foetal malposition | count | 2 | 0 | 0 | 4 | 6 | |
| | % within season | 5.3 | 0.0 | 0.0 | 6.2 | | |
| | % within DYS | 33.3 | 0.0 | 0.0 | 66.7 | | |
| | % of total | 1.1 | 0.0 | 0.0 | 2.3 | | 3.4 |
| Foetopelvic disproportion | count | 22 | 15 | 14 | 27 | 78 | |
| | % within season | 57.9 | 48.4 | 33.3 | 41.5 | | |
| | % within DYS | 28.2 | 19.2 | 17.9 | 34.6 | | |
| | % of total | 12.5 | 8.5 | 8.0 | 15.3 | | 44.3 |
| Foetal malpresentation | count | 1 | 0 | 0 | 0 | 1 | |
| | % within season | 2.6 | 0.0 | 0.0 | 0.0 | | |
| | % within DYS | 100.0 | 0.0 | 0.0 | 0.0 | | |
| | % of total | 0.6 | 0.0 | 0.0 | 0.0 | | 0.6 |
| Twin birth | count | 1 | 1 | 2 | 3 | 7 | |
| | % within season | 2.6 | 3.2 | 4.8 | 4.6 | | |
| | % within DYS | 14.3 | 14.3 | 28.6 | 42.9 | | |
| | % of total | 0.6 | 0.6 | 1.1 | 1.7 | | 4.0 |
| Uterine inertia | count | 3 | 6 | 9 | 6 | 24 | |
| | % within season | 7.9 | 19.4 | 21.4 | 9.2 | | |
| | % within DYS | 12.5 | 25.0 | 37.5 | 25.0 | | |
| | % of total | 1.7 | 3.4 | 5.1 | 3.4 | | 13.6 |
| Uterine torsion | count | 0 | 1 | 0 | 4 | 5 | |
| | % within season | 0.0 | 3.2 | 0.0 | 6.2 | | |
| | % within DYS | 0.0 | 20.0 | 0.0 | 80.0 | | |
| | % of total | 0.0 | 0.6 | 0.0 | 2.3 | | 2.9 |
| Total | count | 38 | 31 | 42 | 65 | 176 | |
| | % of total | 21.6[a] | 17.6[a] | 23.9[a] | 36.9[b] | | 100.0 |

[a,b] Different superscript letters in a row denote significant difference.

result of impaired maternal myometrial function. Improper foetal alignment with the birth canal during parturition, or malpresentation certainly contributes to the incidence of DYS, yet it is encountered rather infrequently (Holland *et al.*, 1993). Holland *et al.* (1993) also reported two transverse presentations (1.3%) and one oblique ventrovertical presentation (0.6%) which was not encountered in the current study. The findings of the present study are also in agreement with the results of another study which support the common beliefs that malpresentations at birth are negligible in relation to the total numbers of calves experiencing DYS (Nix *et al.*, 1998). In their study, twenty calves displayed malpresentation including posterior presentation at birth, accounting for less than 1% of total births. According to these authors, posterior presentation represented 70% of malpresentations (Nix *et al.*, 1998). In the study by Holland *et al.* (1993), malpresentation including posterior presentation was reported as 4% of total births. The authors observed 72.8% incidence of posterior presentation (Holland *et al.*, 1993). Meijering (1984) reported in a review article that posterior presentation of the calf was responsible for 20–40% of the DYS cases recorded by inquiry or met in veterinary practice. The fact that this cause of DYS is relatively more frequently observed in older cows than in heifers may be attributable to the higher rate of FPD in the latter group (Meijering, 1984). Majeed *et al.* (1989) reported that calves in the anterior presentation causing DYS formed approximately 51.7% of the cases, while posterior presentations formed 16.3%. In the current study, regardless of the single calf presented in the ventrotransverse presentation, all other non-anterior presentation births took place in posterior presentation. This discrepancy between the current study and those mentioned above might have been due to the great difference in the number of births evaluated.

By far the most common type of DYS in domesticated dairy cattle is FPD and this is the primary reason why veterinarians perform caesarean operations in these cattle. The two primary determinants of FPD are, in order of importance, calf birthweight and maternal pelvic size which account for 50% and 5–10% of the phenotypic variance in DYS, respectively (Mee, 2008). Mee (2008) also reported that in primiparous cows, an important factor is the relationship between the calf size and the size of the birth canal. Some researchers reported that more than 50% of obstetrical cases were due to FPD (Meijering, 1984; Berger *et al.*, 1992). Also, others reported that of the factors contributing to DYS, calf birth weight and dam pelvic area are the most influential. As a result, most calving difficulties are due to relatively oversized calves (Holland *et al.*, 1993; Nix *et al.*, 1998) especially in first-calf heifers (Meijering, 1984). Holland *et al.* (1993) reported that most of the assisted births (56.0%) occurred among first-calf, 2-year-old heifers. In the current study, in agreement with others, the most important single cause of DYS was FPD (44.3%), of which the majority (79.5%) occurred among heifers and the minority took place among the cows with parities ≥ 4 (Table 2). Also, the results showed that in all seasons, the main single cause of DYS was FPD (Table 3).

The second important single cause of DYS observed in the current study was DFH, which most commonly occurred among first-calf heifers and during winter. In other words, the lowest frequency of this type of dystocia occurred among the cows with parities ≥4 and during the

months of spring (Tables 1 and 2). In the present study, flexion of the joints of foetal fore or hind limbs presented in anterior or posterior presentation, respectively, was considered as FLM. It was the third important cause of DYS observed in this study and among first-calf heifers and during winter months (Tables 1 and 2). In the studies by Holland *et al.* (1993) and Nix *et al.* (1998), FLM was the second most frequent cause of DYS observed. They observed higher incidences of FLM (21.5% and 20%, respectively) and lower incidences of DFH (2.5% and 10%, respectively) (Holland *et al.*, 1993; Nix *et al.*, 1998) in comparison with those in the current study. There is no explanation to justify the discrepancy between the findings of the present study and those of Holland *et al.* (1993) and Nix *et al.* (1998) except the differences in the number of the cows evaluated in these studies. UI, TB, FMP and UT were the subsequent important causes of DYS encountered in the present study, respectively. Most UIs and TBs were seen among the cows with parities ≥4 and during the colder months of the year, i.e. autumn and winter. Only one TB occurred in a first-calf heifer (Tables 1 and 2). This finding is in agreement with other studies in which it was reported that in multiparous cows, DYS is often related to twins or malposition of the calf (Mee, 2008). Moreover, the increase in calving assistance and DYS at twin calvings has been attributed to abnormal presentation, increased number of dead calves, the total weight of calves born and uterine inertia (Mee *et al.*, 2011). In addition, Lombard *et al.* (2007) reported that more than 10% of calves in their study were twins with the majority of twins born to multiparous cows. It was also reported that maternal-related causes (e.g., uterine torsion, hypocalcaemia and cervical stenosis) are the most frequent causes of DYS in multiparous dairy cows (Meijering, 1984; Schuenemann *et al.*, 2011). It has been reported that UI, in which the cervix is fully dilated but myometrial contractions are too weak to expel the foetus, is associated with approximately 10% of all dairy cattle DYS, primarily in pluriparae (Mee, 2008). In another study, it has been reported that UI formed 6% of DYS cases and that this might be due to nutritional deficiency causing hypocalcaemia without paresis leading to the absence of myometrial contractions (Majeed *et al.*, 1989). In the current study, higher incidence of dystocia due to UI was encountered (13.6%), the majority (79.2%) of which occurred among multiparous cows. The discrepancy between the findings of the present study and those of others might be due to the nutrition status and/or the breed of the cows evaluated. It has been reported that insufficient dilatation of the cervix and UT may contribute significantly to the incidence of severe DYS, especially in older cows and that the relative contribution of these causes is probably low in data collected by inquiry (Meijering, 1984), which confirms the finding of the present study in which only five DYS cases (2.9%) were observed, three of them among multiparous cows.

Parity of dam has also been shown to be a large contributor to calving difficulty, although effects of parity were probably due to physical maturation, including increased pelvic dimensions (Nix *et al.*, 1998). It has been reported that multiparous dams experienced significantly less DYS than primiparous dams (Nix *et al.*, 1998). Also it has been shown that there was a greater likelihood of DYS in first-parity dairy cows (Meijering, 1984; Dematawewa & Berger, 1997; Steinbock *et al.*, 2003; Berry *et al.*, 2007; Norman *et*

*al.*, 2010; Mee *et al.*, 2011; Ghanem *et al.*, 2013). The increased risk of DYS in primiparae has been attributed to foetomaternal disproportion, immaturity and incomplete development in young heifers and over fatness and uterine inertia in older heifers (Mee *et al.*, 2011). Olson *et al.* (2009) reported that the calf from a primiparous cow was 2.50 times more likely to be born with assistance than if born from a multiparous cow. Meyer *et al.* (2001) reported >28% DYS in first-parity births in US Holsteins. The results of the present study showed that overall 56.8% of assisted calvings occurred in first-calving heifers. The reasons for the occurrence of more DYS among the first-calf heifers in the current study in comparison to other reports are probably the differences in the pelvic sizes of the dams and/or the birthweights of the calves born to the first calf-heifers. The body sizes of the Holstein heifers used in the current study resp. their pelvic areas were probably smaller than those of the Holstein heifers used in other studies.

It has been shown that season of the year influenced the incidence of DYS in cattle (Majeed *et al.*, 1989; Manfredi *et al.*, 1991; Lombard *et al.*, 2007; Mee *et al.* 2011; Ghanem *et al.*, 2013). Seasonal differences in DYS risk have been attributed to increased gestation length, calf birth weight and stillbirth in colder weather (Mee *et al.*, 2011). It has been reported that high a incidence of DYS was found in autumn and winter. The high rate of DYS in autumn and winter with a peak in December coincided with high birth weights. In spring the decreasing DYS rate is accompanied by a decrease in birth weight (Osinga, 1978). In the present study most of the DYS events occurred during autumn and winter months compared to those occurred during spring and summer months, which is in agreement with those reported by other studies (Osinga, 1978; Majeed *et al.*, 1989; Manfredi *et al.*, 1991; Nix *et al.*, 1998). Nix *et al.* (1998) suggested that since nearly half of every gestation period consistently occurred during periods of high ambient temperature and humidity, it appears logical that lowered birthweight due to chronic heat could have contributed to the observed low levels of DYS. Manfredi *et al.* (1991) reported higher DYS incidence during the winter and concluded that more difficult births are expected during winter months, when the dams are first-calvers, or when the calf is a male. Majeed *et al.* (1989) reported a higher risk of DYS during the winter and autumn as compared with spring or summer. The higher risk of DYS in the winter can be explained by the fact that more calvings occur during this season (Majeed *et al.*, 1989), which is in agreement with the present study in which most calvings occurred during winter. Osinga (1978) reported that in spring the decreasing DYS rate was accompanied by a decrease in birth weight. In the current study calves' weights were not recorded but in agreement with Osinga (1978) less DYS cases were encountered in spring compared to those observed in winter which is probably due to less calf birthweight in spring than that in winter. However, Mee *et al.* (2011) reported a greater likelihood of calving assistance and of DYS in spring and autumn, which is in disagreement with the results of the present study in which DYS during spring or autumn was found less probable compared to that in winter. Also, numerically more DYS cases were recorded in the summer, perhaps because of thermal stress (Ghanem *et al.*, 2013), which is in disagreement with the results of the present study and many others. In the present study, the

least DYS events occurred in summer in comparison to other seasons.

## CONCLUSIONS

The results of the present study showed significantly more calf births in anterior presentation to first-calf heifers compared to those born to cows in parities 2–3 or ≥4 ($P \leq 0.05$). There was no significant difference in the number of calves born in anterior presentation between cows in parities 2–3 and those in parities ≥4 ($P > 0.05$). Also, significantly more dystocia cases were encountered in first-calf heifers compared with those occurred in cows in parities 2–3 or ≥4 ($P \leq 0.05$) but there was no significant difference in this regard between the cows in parities 2–3 and those in parities ≥4 ($P > 0.05$). In addition, the results revealed that DYS due to FPD mostly affected the primiparous cows and that the multiparous cows were mostly affected by dystocia due to TB, UI and UT. Also, the results showed that significantly most DYS cases occurred during winter compared with spring, summer or autumn ($P \leq 0.05$), of which the majority was due to FPD. On the other hand, the least DYS cases were observed in summer months, of which the majority was again due to FPD. Finally, there was no significant difference in the overall incidence of dystocia between spring, summer and autumn ($P > 0.05$).

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