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Some Factors affecting Profitability of Dairy Farms

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Key Words: efficiency, reproductive, productive, economic, dairy.

ABSTRACT:

This study aimed to determine the effect of breed and season on reproductive, productive and economic efficiency of dairy farms under Egyptian conditions. This study was carried out through field survey in three different Egyptian governorates that includes (El Behira, Alexandria and Kafr El-Sheikh) provinces during the period extended from summer 2012 to winter 2014 on random samples of dairy production sectors. These sectors were Farmers (Fallahy), Private farms (special) and governmental farms. The dairy breeds included were Balady (local breed), Holstein-Friesian (exotic breed) and Cross-bred (Balady X Friesian). The reproductive, productive and economic data were collected from cross-sectional and longitudinal and field survey. During the data collection, the researcher was in intimate contact with dairy holders and managers. The dairy farms were visited two times at least, once in summer and the other in winter. The results of our survey concluded that the breed significantly affected (P<0.01) all productive and reproductive traits. Holstein-Friesian cows had highest milk yield, longest lactation period; they maintained their superiority over the other breeds for milk yield in all parities. Despite lower fertility of Holstein-Friesian cows expressed in highest estimate of number of services per conception, days open, calving interval they surpassed all other breeds in the mean milk yield/day of calving interval and average net profit (17273.63 LE/cow/winter season and 4060.96 LE/cow/summer season). This study concluded that, despite the lower fertility of Holstein-Friesian cows expressed in highest estimate of number of services per conception, days open, calving interval they surpassed all other breeds in the mean milk yield/day of calving interval. Also, Behira governorate, winter season and special sectors had the significant lead of milk production.

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1. INTRODUCTION

Developing an understanding of factors influencing profitability in dairy farm is critical as it provides dairy farm managers with the information required to select management strategies that improve their herd's profitability. Also, better knowledge of critical economic variables in dairy farming help extension educators, dairy farm advisers, and policy makers to promote practices and regulations that will assist farmers to remain profitable (Gloy et al., 2002 and Cilek, 2010).

Some farmers produce fluid milk at a low cost per hundred weights, while neighbors produce at an excessively high cost. This indicates the need for studying the conditions underlying business success in dairying (Yeamkong et al., 2010).

The role of dairy cow is to provide high-quality protein and other nutrients for humans so, we must select and manage cows with the goal of reaching the greatest possible efficiency for any given environment, so we have increased efficiency tremendously over the years, yet the variation in productive and reproductive efficiency among animals is still quite large. In part this is because of a lack of full integration of genetic, nutritional, and reproductive biology into management decisions (McNamara, 2012).

Productive and reproductive efficiency of dairy cows are influenced by different non-genetic factors including, breed, calving season, nutrition and management. The productive efficiency indices are milk yield, days in milk, while the reproductive indices are age at first calving, days open, number of services per conception and calving interval (Tadesse, 2010 and Amene et al., 2011).

The most important factors affecting dairy production and reproduction in Egypt include breeds, locality, sector, herd size, calving season, and disease incidence (Omar, 2009). In addition to feed and nutrition (barseem, tibn, concentrates, hay, silage) (Yitaye et al., 2010), veterinary management (drug, vaccine, disinfectant, veterinary supervision), reproductive parameters (calving intervals, days open, dry period, service per conception), also, the most important economic diseases affecting dairy cows under Egyptian conditions includes mastitis, lameness, cystic ovarian disease, endometritis and retained placenta (Dhuyvetter, 2011).

This study aimed to determine the effect of different breeds and seasons on the reproductive, productive and economic efficiency parameters of the dairy farms under Egyptian conditions.

2. MATERIAL AND METHODS

1. Study design and duration:-

This study was carried out through field survey in three different Egyptian governorates of El-Behera, Alexandria and kafr-Elsheik province during the period extended from summer 2012 to winter 2014 on random samples of dairy production sectors. These sectors were Small farmers (Fallahy), Private and Governmental sectors. The dairy breeds included in this study were Balady (local breed), Holstein-Friesian (exotic breed) and Cross-bred (Balady X Friesian).

2. Methods of data collection:-

The data were collected from a cross-sectional and longitudinal field survey. During the data collection, the researcher was in intimate contact with the dairy holders and managers. The dairy farms were visited twice at least, once in summer and the other in winter (Mostafa, 2007 and Ibrahim, 2011)

According to Omar (2009) and Ibrahim (2011) the data was collected by two methods:

a. From the accurate records which available in dairy farms of the study areas.

b. From the structured questionnaire method which established by the researcher in accordance with objectives of this study and admitted to the dairy holders and managers during the time of interview.

3. Types of collected data:

1. Productive and managmental data

Types of cattle breeds (Balady, Cross-bred, Holstein-Friesian), productive season (summer and winter), daily milk yield/Kg, seasonal milk yield/ Kg, lactation period/Day, Types of feed stuffs consumed (barseem, tibin, concentrates, etc…) and amount of feed consumption per season, Productive diseases mainly mastitis and lameness because they are the most important diseases which severely affect the milk production.

2. Reproductive data

The different parameters which collected about the dairy reproductive performance were calving interval, days open, number of services per conception, dry period and the reproductive diseases such as, (Retained placenta, Metritis, Ovarian diseases and repeat breeder).

3. Economic (financial) data

Costs of dairy production that include **Fixed costs** that include the depreciation of buildings, animals, equipments and machines. (Attallah, 1997, Omar, 2009 and Ibrahim, 2011)**,** and **Variable costs** that include the prices "LE" of drugs, vaccines, disinfectants, veterinary supervision, feed cost includes; barseem (Kg /dairy animal), hay (Kg /dairy animal) tibn (Kg /dairy animal), silage (Kg /dairy animal), concentrates (Kg/dairy animal) and other feed costs, labor cost, veterinary costs, and other miscellaneous costs.

Returns of dairy production that include the returns "LE" from (milk sales, calves sales, animal sale and manure sale) according to the market prices during the years of the study.

4. Statistical and Economical analysis:-

The data were collected, arranged, summarized and then analyzed statistically using the computer programs SPSS/PC$^+$ "version 16" (SPSS, 2004). All the productive and reproductive parameters affecting the dairy production as well as their costs and returns were calculated and statistically analyzed for each animal to examine the effect of breed and season on the parameters studied.

The analytical design used was nested design to determine the effect of the following interactions on the variables affecting economic, productive and reproductive efficiencies of dairy cattle according to (Johnson and Wichern, 1998).

Statistical analyses methods:-

The data were analyzed using different statistical methods of data analysis, namely:

1. **Multivariate, General linear model (GLM) for analysis of variance (ANOVA):-**

This statistical model was constructed to determine the effect of breed, season and sector interactions on productive and reproductive variables and their costs and returns according to the following equation (Johnson and Wichern, 1998 and SPSS, 2004).

$$V_{ij} = u + b_i + s_j + (b \times s)_{ij} + e_{ijklm}$$

Where

V_{ij} = The response variable

U = The population constant common to all observation.

s_j = Effect of j^{th} seasons (Summer and Winter).

$(b \times s)_{ij}$ = Effect of the interaction between i^{th} breed and j^{th} season.

e_{ij} = The residual term associated with each Y_{ij}, normally, independently and identically distributed with mean zero and unit variance.

b_i = Effect of i^{th} breed (Balady, Cross and Friesian).

2. Duncan's multiple range test (DMRT)

It was done to test the significant differences between the mean values of the analyzed parameters which related to productive, reproductive, costs and returns of dairy production (Armitage et al., 2002 and SPSS, 2004).

3. RESULTS AND DISCUSSION:

The most important results that obtained from this study include:-

1.Effect of different seasons among breeds on costs of veterinary management patterns/season.

Table (1) cleared that; the average total veterinary cost significantly differed (P<0.01) among breeds not seasons. The highest value for Holstein-Friesian cow (154.84LE/cow) in winter season and the lowest value (86.45LE/cow) for Balady cow in summer season. In Cross-bred, it was (104.73 and 108.62 LE/cow) for winter and summer season, respectively. The highest value for breeds ranged from (93.65L.E/cow to 149.09L.E/cow) for both balady and Frisian breeds, respectively. Moreover, there is no significant effect of season on average drug value. The higher drug value (102.22 LE/cow) appeared for Holstein-Friesian cow in winter season and the lower value occurred in summer season for Balady breed (60.30 LE/cow). While breed affect significantly on drug value and the highest value ranged from (65.27 L.E/cow to 98.25 L.E/cow) for balady and Frisian breeds, respectively.

Furthermore, the season also has no significant effect on value of vaccine, disinfectant and veterinary visits. While, breed has a significant effect on these values. The highest value of vaccine for breed ranged from (3.32L.E/cowto12 L.E/cow) for balady and Frisian breed, while for disinfectant ranged from (2.22L.E/cow to 4.32L.E/cow) for balady and Frisian breeds and for veterinary visits (22.82L.E/cow to 34.61L.E/cow) for balady and Frisian breeds, respectively. Holstein-Friesian cow more susceptible to diseases than Cross and Balady breeds. The results agreed with those of Atallah (1997) where he reported that, the medication, vaccination, disinfections and veterinary supervision costs (veterinary costs) differed significantly (P<0.01) among dairy breeds due to the differences in farmer's experiences, veterinary supervision, climatic conditions, diseases incidence. While, the result disagreed with Omar (2009) where, he reported that the values of drug, vaccine, disinfectant and total veterinary cost higher in summer than winter season and for Friesian than Cross and Balady cows.

2.Effect of different seasons among breeds on reproductive efficiency measures.

The results cleared in Table (2) showed that; the average calving interval significantly differed (P<0.01) among breeds. Its level observed in breed ranged from (370.54day/cow to 383.36 day/cow) for crossbred and Frisian breed, respectively. This result agreed with those of (*Jones, 2000)* where he reported that maximum net economic returns are earned when calving interval is 12 to 13 months compared with 18 month. Also, this result run with those of those of *Muller et al., (2000)* they stated that national milk recording data in Britain has shown that the higher yielding herds have longer calving intervals varying from 378 days for herds producing 6000 kg milk to 393 days for herds varying in milk yield between 8 500 to 9 500 kg. But this result disagreed with those of Ahmed *et al., (2002)* they observed that calving interval may reach to 472.3 days for Holstein cows under Egyptian conditions.

Also, the result cleared that there was a significant different (P<0.01) in days open among dairy breeds. The value of days open ranged from (90.88 day/cow to 107.14) for crossbred in winter season and Frisian breed in summer season. While the higher value for breed ranged from (91.04 day/cow to 107.06 day/cow) for crossbred and Frisian breed. The obtained results in agreement with those of Barnes (2001) where he reported that days open should not be more than 113 days to achieve an optimal calving interval of 13 months. Also, Cilek (2010) reported that cows calving in the summer had the greatest number of days open and those calving in the winter (January to March) had the fewest days open.

Furthermore, there is a significant difference among breeds in dry period. The highest value of dry period (136.73 day/cow) recorded in balady breed in winter season and the lowest value (65.54 day/cow) in Frisian breed in winter season. While the value for breeds ranged from (67.01 day/cow to 136.07 day/cow) for Frisian and balady breed. They added that the cows calved in spring season had the longest dry period (167 ± 3.96 days), while the cows calved in hot humid season had the shortest dry period (161 ± 4.17 days). This result agreed with Sattar et al., (2005) and Ngodigha et al., (2009) they reported that calving interval, number of service per conception, days open, dry period and gestation length are most important parameters used to measure the reproductive efficiency of dairy herd. A herd with 13-15 months calving interval, 34 months for age at first calving, 1.33 services per conception and 5 kg milk per day per cow could be economically profitable.

The results of gestation period cleared that the average gestation period ranged from (276.29 to 279.5days) in Holstein-Friesian and crossbred cattle that calved in winter seasons, respectively. This might be due to difference in fetus sex, environmental temperature and breed. This result agreed with Rahman et al., (1998), they reported that the average gestation length for indigenous and cross-bred was 287.79 and 285.40 days, respectively.

Also, the results of number of services per conception. Cleared that the higher services per conception (2.22, 2.25and 2.41 S/C) were recorded for Balady, Cross and Holstein-Friesian cows, respectively in summer season. While, the lower services per conception (2.3, 2.2 and 2.4 S/C) were observed in Balady, Cross and Holstein-Friesian cows, respectively in winter season. This result agreed with Mostageer, (1989) he reported that under Egyptian condition, the number of service per conception in Egyptian Balady cattle was 2.25 and in Friesian cattle 2.6 S/C.

Also, results from table (2) illustrated that; the dairy cattle breeds had a significant effect (P<0.01) on days in milk according to season. As, the average days in milk were longer (121.224, 145.25and 157.37days/cow) for Balady, Cross and Holstein-Friesian cows, respectively in winter season, while it were shorter (119.14, 136.54and 142.41days/cow) for Balady, Cross and Holstein-Friesian cows, respectively in summer season. These variations might be regard to variations in availability of green fodder and forage between seasons, milk producing ability of dairy breed and seasonal environmental temperature. The results run in the same line of Marai (2009) who reported that, the days in milk were shorter in summer than winter season, and higher in Friesian than Cross-bred and Balady cows.

Also, cattle breeds had a significant effect (P<0.01) on days in milk. The higher value for breeds ranged from (120.26 to 149.76 days/cow) for balady and Frisian breed, respectively. This result agreed with those of Phung (2009) where he reported a higher milk yield in Friesians than indigenous cattle breed.

3.3. Effect of different seasons among breeds on net profit Parameters

Table (3), cleared that the average total feed cost was differed significantly (P<0.01) among dairy breeds and within different seasons as, the average cost of feed was the highest (12142.99LE/cow) for Holstein-Friesian cow that calved in summer season and the lowest (1706.64LE/cow) for Balady cow that calved in winter season. In Cross-bred, the feed cost was ranged from (2989.41to 3719.68LE/cow) in winter and summer seasons, respectively and the different is significant. The reason for higher feed cost for Holstein-Friesian and Cross-bred is probably due to higher prices of feed stuffs and ingredients as a result of feed shortage and the farmer search for good quality feed to sustain the high level of milk production. On the other hand, the feed cost in summer higher than winter season for Balady breeds might be due to shortage of feed in summer and the farmer spend more money to purchase feed. The results run in the same line of those of Balaine et al., (1995) and Omar (2009) they observed that feeds generally cost more as cows are fed for higher milk production especially in summer than winter months.

Table (3) cleared that the different breeds of cattle and seasons had significant (P<0.01) effect on average total return, as, the average total return recorded the highest value (29863.62 LE/cow/year) for Holstein-Friesian cow that calved in winter season, and the lowest value (5699.46 LE/cow/year) for Balady cow that calved in summer season. This result might be due to higher milk yield in winter than summer calving and higher in foreign breeds than indigenous ones. These results agreed with those of Khan (2007) he reported that, the return from milk production and marketing margin of milk were differed significantly between Friesian, Cross-bred and Local breed.

Table (3) revealed that, the dairy cattle breeds and different seasons had a significant effect (P<0.051) on average total variable cost. The average variable cost showed lower level (2456.49LE/cow/season) for Balady breed in winter season while, its higher value (13538.93LE/cow/season) was for Holstein-Friesian breed that in summer months. These results agreed with Omar (2009) he revealed that, the variable cost differed significantly among cattle breeds and higher for Friesian and Cross-bred than Balady breed.

According to table (3), there was a significant differences of Total fixed cost among breeds

(P<0.01). As, the average value of fixed cost was higher (1614.31 LE /cow /year) for Holstein-Friesian, then (687.11 LE/cow/year) for Cross-bred and (459.05 LE/cow/year) for Balady breed, respectively. The higher fixed cost for Holstein-Friesian and Cross-bred cows than Balady one might be due to the higher depreciation value of animal and building than Balady cows. These results agreed with Omar (2009), he stated that the fixed cost differed significantly among dairy breeds and not between seasons.

Table (3) illustrated that, the average total cost per cow differed significantly (P<0.01) among dairy breeds and between different seasons. In Balady breed, the average total cost ranged from (2911.59 to 3450.99 LE/cow) for winter and summer seasons, respectively. In Cross-bred, it ranged from (4625.73 to 5350.75LE/cow) for winter and summer seasons, respectively, and in Holstein-Friesian was ranged from (12589.99 to 15149.02 LE/cow) for winter and summer seasons, respectively. The variation of total cost might be regards to variation in feed stuffs prices between seasons. The results agreed with Khan et al., (2008) they reported that, the total cost differed according to seasons and breed and the difference is significant.

While, the average net profit per cow differed significantly (P<0.1 among dairy breeds and between different seasons. In Balady breed, the average net profit ranged from (2248.47 to 3629.89 LE/cow) for summer and winter seasons, respectively. In Cross-bred, it ranged from (2292.32 to 6137.96 LE/cow) for summer and winter calving, respectively, and in Holstein-Friesian was ranged from (4060.96 to 17273.63 LE/cow) for summer and winter seasons, respectively. The variation net profit might be regards to variation in feed stuffs prices, seasonal variation in milk price and amount of milk sale. The results agreed with Omar (2009) who, reported that, the net profit differed from breed to breed and season to seasons.

4. Effect of different seasons among breeds on Collective efficiency measures:

Table (4) cleared that, the value of **total return to total cost** differ significantly at (P<0.01) among different breeds within different seasons higher value recorded in Holstein Friesian (2.36) In winter season and the lower value recorded in Holstein Friesian in summer season (1.26) while for breeds the value ranged from (1.80 to 1.97) for Frisian and balady breed, respectively.

Moreover, the season has a significant effect (P<0.01) on value of total return to total variable costs. The value ranged from (1.42 to 2.73) for Frisian breed in summer season and crossbred in winter season. Breed also, affect significantly (P<0.01) and the value ranged from (2.05 to 2.32) for Frisian and balady breed, respectively.

Furthermore, the value of net profit to total cost (Table 4) differ significantly at (P<0.01) among different breeds within different seasons higher value recorded in Holstein Friesian (1.36) In winter season and the lower value recorded in Holstein Friesian in summer season (0.26) while for breeds the value ranged from (0.80to 0.97) for Frisian and balady breed, respectively.

Also, the season has a significant effect (P<0.01) on value of net profit to total variable costs. The value ranged from (0.29to 1.56) for Frisian breed in summer season and crossbred in winter season, respectively. Breed also, affect significantly (P<0.01) and the value ranged from (0.91to 1.14) for Frisian and balady breed, respectively.

This result agreed with those of Mostafa (2007) he reported that maximizing gross return and minimizing cost of production lead to increase net profit and farm profitability. Also, the total return and net profit from dairy operation differed significantly (P<0.01) among different dairy breed, seasons.

Table (4) cleared that, the value of total veterinary cost to total cost differ significantly at (P<0.01) among different breeds. The higher value recorded in balady breed (0.034) In winter season and the lower value recorded in Holstein Friesian in summer season (0.009) while for breeds the value ranged from (0.011 to 0.030) for Frisian and balady breed, respectively.

Moreover, the season has a significant effect on value of total veterinary cost to total variable costs as the value ranged from (0.011 to 0.041) for Frisian breed in summer season and balady breed in winter season. Breed also, affect significantly (P<0.01) and the value ranged from (0.012 to 0.035) for Frisian and balady breed, respectively.

The results of our survey concluded that the breed significantly affected (P<0.01) all productive and reproductive traits. Holstein-Friesian cows had longest lactation period; they maintained their superiority over the other breeds for milk production. Despite lower fertility of Holstein-Friesian cows expressed in highest estimate of number of services per conception, days open and calving interval they surpassed all other breeds in the longest lactation period. Moreover, a significant variation in lactation length in cows calved during different seasons. This could be due to the seasonal influences as well as the type of feed, temperature, humidity and management which varies greatly during different seasons.

Table (1):- Showing the effect of different seasons among different breeds on costs of veterinary management (drugs, vaccine, disinfectant, veterinary visits and total veterinary management) /season.

Breed	Season	No. of Records	veterinary Management costs (cash value/LE)				
			Drugs	Vaccine	Disinfectant	Veterinarian Visits	Total Veterinary Management
Frisian	Summer	124	94.41±3.00 a	12.00±0.15 a	4.15±0.16 a	32.98±1.22 a	143.54±4.20 a
	Winter	120	102.22±3.05 a	12.00±0.15 a	4.33±0.16 a	36.29±1.24 a	154.84±4.27 a
Overall mean		244	98.25±2.71 A	12.00±0.00 A	4.23±0.06 A	34.61±1.05 A	149.09±3.73 A
Crossbred	Summer	118	75.32±3.08 b	3.90±0.16 b	2.83±0.16 b	26.57±1.25 b	108.62±4.31 b
	Winter	116	72.47±3.10 b	4.24±0.16 b	2.76±0.16 b	25.26±1.26 b	104.73±4.35 b
Overall mean		234	73.91±1.86 B	4.06 ±0.13 B	2.79±0.13 B	25.91±0.77 B	106.69±2.63 B
Balady	Summer	84	60.30±3.65 c	3.29±0.18 c	2.15±0.19 c	20.71±1.48 c	86.45±5.11 c
	Winter	98	69.54±3.38 b	3.37±0.17 c	2.29±0.18 c	24.64±1.37 b	99.84±4.73 b
Overall mean		182	65.27±1.86 C	3.32 ±0.17 C	2.22±0.15 C	22.82±0.83 C	93.65±2.73 C

Lower case letters indicated that: Means of different letters within the same column significantly different at ($p<0.01$)
Upper case letters indicated that: Means in the same column of different letters significantly different at ($p<0.01$)

Table (2):-Showing the effect of different seasons among different breeds on reproductive and productive efficiency measures (calving intervals, days open, dry period, gestation period, service per conception and days in milk)

Breed	**Season**	**No. of Rec.**	**Reproductive and productive Traits**					
			Calving interval (day/cow)	**Days open (day/cow)**	**Dry period (day/cow)**	**Gestation period (day/cow)**	**Service per Conception**	**Days in milk (day/cow)**
Frisian	**Summer**	**124**	**383.45±4.78 a**	**107.14±4.79 a**	**68.44±2.55 c**	**276.31±0.63 b**	**2.41±0.13 a**	**142.41±0.79 c**
	Winter	**120**	**383.28±4.86 a**	**106.99±4.87 a**	**65.54±2.59 c**	**276.29±0.64 b**	**2.46±0.14 a**	**157.37±0.80 a**
Overall mean		**224**	**383.36±4.95 A**	**107.06±4.97 A**	**67.01±1.01 C**	**276.30±0.45 B**	**2.43±0.11 A**	**149.76 ± 0.83 A**
Crossbred	**Summer**	**118**	**370.71±4.90 b**	**91.20±4.91 b**	**94.29±2.61 b**	**279.51±0.64 a**	**2.25±0.14 a**	**136.54±0.81 d**
	Winter	**116**	**370.38±4.95 b**	**90.88±4.95 b**	**94.51±2.63 b**	**279.50±0.65 a**	**2.22±0.14 a**	**145.25±0.81 b**
Overall mean		**234**	**370.54±2.31 B**	**91.04±2.27 B**	**94.39±2.45 B**	**279.50±0.27 A**	**2.23±0.08 A**	**140.86 ±0.63 B**
Balady	**Summer**	**84**	**373.12±5.81 b**	**96.23±5.82 ab**	**135.30±3.09 a**	**276.89±0.76 b**	**2.40±0.16 a**	**119.14 ±096 e**
	Winter	**98**	**373.21±5.38 b**	**95.36±5.39 ab**	**136.73±2.86 a**	**277.86±0.71 ab**	**2.35±0.15 a**	**121.224±089 e**
Overall mean		**182**	**373.17±1.80 B**	**95.75±1.83 B**	**136.07±2.02 A**	**277.41±0.68 A**	**2.37±0.08 A**	**120.26 ± 0.41 C**

Lower case letters indicated that: Means of different letters within the same column significantly different at ($p<0.01$)
Upper case letters indicated that: Means in the same column of different letters significantly different at ($p<0.01$)

Table (3):- Showing the effect of different seasons among breeds on cost parameters and net profit (Total feed costs, Total return, Total variable costs, total fixed costs, total costs and net profit).

Breed	Season	No. of Rec.	L E/Cow/Season					
			Total feed costs	Total return	Total variable costs	Total fixed costs	Total costs	Net profit
Frisian	Summer	124	12142.99±126.82 a	19209.98± 293.96 b	13538.93±126.85 a	1610.09±16.68 a	15149.02±128.02 a	4060.96±194.68c
	Winter	120	9562.65±128.91 b	29863.62 ± 298.82a	10971.32±128.94 b	1618.67±16.96 a	12589.99±130.14 b	17273.63±197.90a
Overall mean		244	10873.96±152.18 A	24449.48 ± 456.88 A	12276.17±151.58 A	1614.31±17.62 A	13890.48±152.42 A	10559.00 ± 471.36 A
Crossbred	Summer	118	3719.68±130.00 c	7643.07 ± 302.63d	4673.31±129.99 c	686.78±17.17 b	5350.75±131.79 c	2292.32±200.42d
	Winter	116	2989.41±131.12 d	10763.68 ± 303.93c	3938.28±131.11 d	687.45±17.25 b	4625.73±132.36 d	6137.96±201.28b
Overall mean		234	3357.66±74.94 B	9196.68 ± 182.71 B	4308.93 ±75.48 B	687.11±6.67 B	4989.79±76.08 B	4206.89 ± 154.27 B
Balady	Summer	84	2251.91±154.08 e	5699.46 ± 357.16e	2987.32±154.12 e	463.66±20.27 c	3450.99±155.54 e	2248.47±236.53c
	Winter	98	1706.64±142.65 f	6541.48 ± 330.67e	2456.49±142.68 f	455.10±18.76 c	2911.59±144.00 f	3629.89±218.99c
Overall mean		182	1958.30±47.82 C	6152.86 ± 99.93 C	2701.48±48.46 C	459.05±7.20 C	3160.54±49.18 C	2992.31± 77.28 C

Lower case letters indicated that: Means of different letters within the same column significantly different at (p<0.01)
Upper case letters indicated that: Means in the same column of different letters significantly different at (p<0.01)

Table(4):- Showing the effect of different seasons among different breeds on Collective efficiency measures (total return to total costs, total return to total variable costs, net profit to total costs , net profit to total variable costs , total veterinary cost to total cost and total veterinary cost to total variable cost).

Breed	Season	No. of Rec.	Collective efficiency measures					
			Total Return To		Net profit To		Total veterinary cost	
			Total costs	Total variable costs	total cost	total variable cost	total cost	total variable cost
Frisian	Summer	124	1.26±0.01 f	1.42±0.01 e	0.26±0.01 f	0.29±0.02 e	0.00978±0.00077c	0.01101±0.00093d
	Winter	120	2.36±0.01 a	2.71±0.01 ab	1.36±0.01 a	1.56±0.02 a	0.01259±0.00078c	0.01451±0.00095d
Overall mean		244	1.80± 0.03 C	2.05± 0.04 C	0.80 ±0.03c	0.91± 0.04 C	0.01115±0.00032C	0.01273±0.00037 C
Crossbred	Summer	118	1.42±0.01 e	1.64±0.02 d	0.42±0.01e	0.49±0.02 d	0.02101±0.00079b	0.02437±0.00096c
	Winter	116	2.31±0.02 b	2.73±0.02 a	1.31±0.02 b	1.54±0.02 a	0.02318±0.00079b	0.02772±0.00097b
Overall mean		234	1.86± 0.03 B	2.18± 0.03 B	0.86± 0.03 B	1.01± 0.03 B	0.02208±0.00060B	0.02603±0.00748B
Balady	Summer	84	1.66±0.02 d	1.93±0.02 c	0.66±0.02 d	0.76±0.02 c	0.02538±0.00093a	0.02957±0.00113b
	Winter	98	2.24±0.02 c	2.67±0.02 b	1.24±0.02 c	1.48±0.02 b	0.03459±0.00086a	0.04132±0.00105a
Overall mean		182	1.97± 0.02 A	2.32± 0.03 A	0.97± 0.02 A	1.14 ±0.02 A	0.03034±0.00893A	0.03589±0.01091A

Lower case letters indicated that: Means of different letters within the same column significantly different at (p<0.01)
Upper case letters indicated that: Means in the same column of different letters significantly different at (p<0.01)

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