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Full Length Research Paper

Damage types, causes of damage and herd leaving ages in dairy cattle under the scope of livestock insurance and subject to compensation in some districts of Izmir Province of Turkey

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In this research, in some districts of Izmir province, damage types, causes of damage, ages at which the damage occured and hot carcass weights of Holstein cattle which are under the scope of state supported livestock insurance and which were slaughtered involuntarily due to various reasons, which died, aborted or whose calves died, were examined. The research data were obtained from the damage reports prepared by Agricultural Insurances Pool (AIP) experts and records kept by slaughterhouses. Damage types that are subject to compensation in dairy cattle are classified by AIP under four groups: involuntary slaughtering, death, abortion and calf death. The distribution percentages of the 215 damage reports into groups of involuntary slaughtering, death, abortion and calf death were found as 53.5, 6.5, 13.5 and 26.5% respectively. The mean herd leaving ages due to death and involuntary slaughtering were found to be 42.6 months and 52.4 months, respectively. In involuntary slaughtering, the causes of damage were separated into five groups as udder disorders, reproduction and calving problems (excluding abortion), digestive tract disorders, foot and leg problems, and injury and other problems. In the 115 cattle that were involuntarily slaughtered, the distribution percentages of the above causes were 51.3, 17.4, 11.3, 7.8 and 12.2%, respectively. The mean carcass weights of involuntarily slaughtered cattle were 224, 216, 198 and 204 kg for winter, spring, summer and autumn, respectively (P<0.10). The overall mean was 216 kg. Although the number of companies active in agricultural insurance is 22, it was observed that the cattle examined in our research were insured by only 4 companies. Livestock insurance is a practice which could help with the healthy development of the livestock sector.

Key words: Livestock insurance, dairy cattle, damage type, causes of damage, herd leaving age.

INTRODUCTION

With its strategic importance for countries, agriculture is described as open air factory, and it is highly dependent on natural conditions. Despite advances in technology, natural conditions cannot be completely controlled by the producer in agricultural production. As a result of various risks in agricultural production, problems, such as lack of productivity, price instability, and fluctuations in earnings occur. The most effective system in preventing damages which arise from risks and uncertainties in agricultural production is agricultural insurance (Çetin, 2007; AIP, 2008).

In the world, agricultural insurance practices in the modern sense started in Europe between 1770 and 1800. In Turkey, on the other hand, legal regulations about agricultural insurance were initiated with provisions added to the Commercial Code dated 1926. The practices of agricultural insurance were initiated by eker

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Insurance Inc. in 1957 with hail insurance; and Ba ak Insurance Inc. joined the sector in 1959 with hail and livestock insurance (Çetin, 2007). However, the agricultural insurance sector could not developed adequately for almost 50 years due to the sheer size of potential risks in the agricultural sector, lack of state support, inadequacy of legal regulations, and problems associated with the insurance sector in general. Following many attempts to pass separate regulations to cover the risks that pose a threat to the agricultural sector, Agricultural Insurance Code No. 5363 was finally legislated on June 14, 2005 and went into effect after it was announced in the Official Journal no. 25852 on June 21, 2005 (Official Journal, 2005) . Within the scope of this code, the Agricultural Insurance Pool (AIP) was created. Agricultural Insurance Pool Operation Inc. (AIP Inc.) was founded in December 2005 to undertake the running of the pool. Currently, 22 insurance companies are members of AIP Inc., which runs all activities on behalf of AIP, except for selling insurance policies which is done by the companies themselves.

In 2006, 2007, 2008, 2009 and 2010, provision of state-support at the rate of 50% of the insurance premium was decided (Official Journal, 2008; 2009; AIP, 2009). The positive effect of the state-supported livestock insurance was seen shortly after it was put into practice. As a matter of fact, while the number of cattle insured within the last seven months of 2006 when the practice of state-supported livestock insurance began was 6710, this figure has increased to 55 520 in 2007 and 71 955 in 2008 (AIP, 2008, 2009). For dairy cattle insurance, coverage for abortion and calf death were later added. The coverage amount is 10% of insurance amount of dam of the dead calf (SSLLI, 2008a).

Even though the rate of economic loss due to natural conditions is lower in livestock production compared to crop production (Wenner, 2005), livestock, too, is subject to many risks such as various diseases, pregnancy, calving, surgical operation, accidents, poisoning, natural disasters, and so forth.

Livestock insurance could be expected to bring down the rate of reasons for involuntary culling since it will require cattle breeders to maintain certain standards with regards to housing, nutrition, management and health protection.

There are not many studies in Turkey concerning the herd life and reasons for removal in cattle. On the other hand, even though it is possible to record the reasons for removal of cows in the database of the Cattle Breeders' Association of Turkey, which is expected to be an extensive database for the reasons for culling, it is reported that very little data is collected and that the data collected is mostly unusable (Galiç et al., 2007). Furthermore, it is reported that productivity potential of Holstein cows raised in Turkey is not fully utilized and that many leave the herd in early ages (Kaya et al., 2003). Since the practice of state-supported livestock insurance in Turkey is relatively new, no study has yet been found on the reasons for removal of insured dairy cattle. Moreover, to our knowledge, there is no study in English literature concerning the reasons for removal in insured dairy cattle.

This study aims to determine, based on expert reports, the types and causes of damage, ages when damage occurs, and carcass weights of involuntarily slaughtered Holstein cattle under the scope of state-supported livestock insurance in some districts of Izmir province in western part of Turkey.

MATERIALS AND METHODS

Data in this study was collected from the 'State- Supported Livestock Insurance Damage Reports' prepared by two veterinary surgeons, which were working for AIP Inc. in Ödemi district, on 215 Holstein females (cases) in 41 herds in 6 districts of Izmir province between September 2007 and September 2008. Hot carcass weights of involuntarily slaughtered females were collected from slaughterhouse reports or invoices or both drawn up for the carcasses sold. AIP Inc. classifies 'damage types' that are subject to compensation in insured cattle under four groups:

(i) Involuntary slaughter.
(ii) Death.
(iii) Abortion.
(iv) Calf death.

The report also details the 'cause of damage' in each case. In the study, the detailed causes of damage under the types of damage were classified as various subgroups under damage groups in Table 1.

The following linear models were used in the analysis of the data. For the herd leaving age of the cattle that were either involuntarily slaughtered or died, the model was:

$$Y_{ij} = \mu + a_i + e_{ij.}$$

where Y_{ij} = herd leaving age, μ = overall mean, a_i = effect of the i^{th} damage type (I =1, 2), e_{ij} = random error (Table 2).

For the age at which the damage occurred in cattle which aborted or whose calf died, Y_{ij} = age at which the damage occurred, a_i = effect of the i^{th} damage type (i=1, 2) (Table 2). For the herd leaving age of the cattle involuntarily slaughtered, Y_{ij} = herd leaving age, a_i = effect of the i^{th} damage group (i=1-5) (Table 5). For the herd leaving age of the cattle died, Y_{ij} = herd leaving age, a_i = effect of the i^{th} damage group (I = 1-5) (Table 6). For the age at which the damage occurred in cattle which aborted, Y_{ij} = age at which the damage occurred, a_i = effect of the i^{th} damage group (I = 1, 2) (Table 7). For the age at which the damage occurred in cattle whose calf died, Y_{ij} = age at which the damage occurred, a_i = effect of the i^{th} damage group (I = 1-3) (Table 7).

In the analysis of the data with regards to the hot carcass weights of the cattle that were involuntarily slaughtered, the following linear model was used:

$$Y_{ijkl} = \mu + a_i + b_j + c_k + e_{ijkl.}$$

where Y_{ijkl} = hot carcass weight, μ = overall mean, a_i = effect of the i^{th} damage group (I = 1- 5), b_j = effect of the j^{th} class of herd leaving age (j = 1-6), c_k = effect of the k^{th} slaughter season (k = 1 - 4), e_{ijkl} = random error (Table 8).

Table 1. Detailed causes of damage and damage groups according to the types of damage in insured dairy cattle filed in damage report[1]

Damage types[2]	Causes of damage	Damage groups
Involuntary slaughter (115)	Chronic mastitis (46), Clinical mastitis [acute septic mastitis (6), acute mastitis (4)], Injury (2), Anomaly (1)	Udder disorders (59)
	Infertility (7), Metritis (5), Ovarian cyst (1), Anomaly (no ovary) (1), Calving problems [vaginal tear due to dystocia (5), pelvic fracture (1)]	Reproduction and calving problems (20) (excluding abortion)
	RPT (Reticuloperitonitis traumatica) (3), Liver disorder (4), Enterotoxemia (1), Toxemia (1), Left displaced abomasum (1), Tympany (1), Constipation (1), Cause unknown (1)	Digestive tract disorders (13)
	Arthritis (5), Sole ulcer (4)	Foot and leg problems (9)
	Hip or leg fractures due to fall or slips (12), Dermatitis (1), Respiratory (1)	Injury (12) and Other problems (2)
Death (14)	Left displaced abomasum (2), Tympany (1), RPT (1), Cause unknown (2)	Digestive tract disorders (6)
	Metritis (1), Prolapsus uteri (1)	Reproduction and calving problems (2)
	Heart attack (2)	Circulatory system problems (2)
	Pneumonia (2)	Respiratory disorders (2)
	Trapped in feed fence (1), Internal bleeding (1)	Accident (1) and Other (1)
Abortion (29)	Abortion for unknown causes (26)	Cause unknown (26)
	Foetus drying up (2), Anomaly (1)	Other (3)
Calf death (57)	Dystocia due to various reasons (32)	Calving problems (32)
	Septicaemia (deaths within first 7 days) (20)	Septicaemia (20)
	Intestinal anomaly (4), Fluid ingestion (1)	Other (5)

[1]Numbers in parentheses indicate the number of cases. [2]Additional reports for a total of 8 cattle, 5 for calf death and 3 for abortion, were later drawn (1 to 37 days later) due to involuntary slaughter for various reasons (7 udder disorders, 1 digestive tract disorder).

Table 2. According to the damage types, means for the ages at which the damage occurred for insured cattle.

Damage types	N	%	Mean age (days)	SE	Min	Max
Involuntary slaughter	115	53.5	1593[a]	52.9	572	2738
Death	14	6.5	1295[b]	151.5	506	2444
Abortion	29	13.5	1214	90.8	646	2141
Calf death[1]	57	26.5	1281	64.8	709	2604

[1]Values for the dams of calves which died at birth or within seven days following birth. [a,b]The difference between the means for age of involuntary slaughter and age of death is significant (P<0.10).

In determining the factors influencing the analyzed traits, identifying the descriptive statistics and frequencies, PROC GLM, MEANS and FREQ procedures of the SAS program were applied. Duncan test was used in the comparison of means (SAS, 1999).

RESULTS

As of mid September 2008, the ratio of cattle insurance damage reports included in the study to the total damage reports in Turkey was 1.33%. The cattle for which damage reports have been filed were insured by four insurance companies. The 160 (74.4%) of the reports belong to cattle insured by the one company whereas 55 (25.6%) belong to the other three companies. The 215 damage reports examined belong to Holstein cattle raised in 41 herds in six districts of Izmir, 131 in Ödemi , 34 in Kemalpa a, 20 in Bayındır, 18 in Tire, 11 in Kiraz and 1 in Beyda . The district of Ödemi , where most of the damage reports have been filed, included 27.3% of the member herds of the Cattle Breeders' Association of

Izmir and 27.7% of the cattle registered (Association of Izmir, 2008, personal communication). The number of damage reports ranged from 1 to 36 in the herds examined, with the mean report per herd being 5.2.

The proportional distribution for involuntary slaughter, death, abortion and calf death expressed as damage types was 53.5, 6.5, 13.5 and 26.5%, respectively (Table 2). The mean values for herd leaving ages of cattle that were involuntarily slaughtered or died were found as 1593 days (52.4 months) and 1295 days (42.6 months), respectively. It was seen that the herd leaving age for involuntarily slaughtered cattle was 298 days longer compared to the cattle that died ($P<0.10$). No difference was found between the ages of the cattle which aborted and those whose calves died.

The distribution of damage types according to the age at which damage occurred are shown in Table 3. It was determined that 46% of the cattle sent to involuntary slaughter were between 37 to 60 months of age. The 62% of the abortion cases occurred in cattle between the ages of 25 to 48 months. The 68% of the dams whose calves died at birth or within seven days following birth were between the ages of 25 to 48 months.

The distribution of damage types according to the season in which damage occurred is given in Table 4. Involuntary slaughter, death and abortion mostly occurred in summer whereas calf death occurred mostly in winter.

The herd leaving reasons (causes of damage) of 115 cattle involuntarily slaughtered and the ages they left the herd are shown in Table 5. While some of the involuntary slaughter was carried out in an emergency due to injury or severe illness, most were non-emergency involuntary slaughter. Involuntary slaughter due to udder disorders had the largest share (51.3%), followed by reproduction and calving problems (17.4%), injury and other problems (12.2%), digestive tract disorders (11.3%), and foot-leg problems (7.8%). The earliest herd leaving age was observed as a mean of 1418 days with cattle having foot and leg problems, and the latest herd leaving age was observed as a mean of 1743 days with cattle having digestive tract disorders. However, no significant difference was found.

Digestive tract disorders rank the first (42.9%) among the causes of death of the cattle. Death rates due to problems with reproduction, circulatory system, respiratory system and other were found to be the same (Table 6). The mean earliest age of death was due to respiratory disorders (832 days) while the latest age was for those that died due to reproduction problems (1700 days). However, no significant difference was found.

The means for dam ages at the time of the damage due to abortion and calf death are shown in Table 7. The mean age of cattle which aborted due to unknown causes was 1257 days whereas the mean age in the other cases was found to be 844 days ($P<0.10$). The calf deaths due to calving problems happened to be the most frequent reason, accounting for 56.1% of all the cases, followed by calf death because of septicaemia (35.1%) and other reasons (8.8%). No significant difference was found with regards to the mean age of cows whose calves died due to various reasons.

In the study, the hot carcass weights of the cattle involuntarily slaughtered were also examined. Although the number of cattle for which damage reports had been filed was 115, the carcass weights of 112 cattle were determined since the carcass of 3 cattle was deemed inappropriate for consumption due to various reasons (Table 8). No significant difference in carcass weight was found among the damage groups or among the herd leaving age classes. According to the slaughter season, the hot carcass weights of cattle were 224, 216, 198 and 204 kg in winter, spring, summer, and autumn, respectively ($P<0.10$). Involuntary slaughter was done mostly in summer ($n=41$) and the mean hot carcass weight was the lowest in this season.

DISCUSSION

Although AIP Inc. had 22 member insurance companies, the damage reports in the study were for cattle insured by four companies. The majority of the reports were for cattle insured by the same company as well. As a matter of fact, even though there are several companies that provide agricultural insurance in Turkey, it is reported that a large number of agricultural insurance premiums is covered by 3 or 4 insurance companies (Çetin, 2007). A more active involvement by other insurance companies too will contribute to the recognition and spread of agricultural insurance.

Involuntary slaughter and death, two of the damage types examined in this study, are covered in the scope of involuntary reasons for herd leaving in cattle. In various studies, it was seen that the ratio of cows involuntarily removed from the herd was 50 to 80% to the total number of cows removed (involuntarily and voluntarily) from the herd (Bascom and Young, 1998; Seegers et al., 1998a; Stevenson and Lean, 1998; Beaudeau et al., 2000; Yaylak, 2003). Voluntary reasons for culling such as low production, type traits, and behavioral problems are not covered in the scope of this study since they are not covered by insurance. Although there are different studies on the reasons for involuntary and voluntary culling, no study on the reasons for removal in insured cattle was found.

The herd leaving ages in this study (Table 2) are lower than values determined in other studies. The herd leaving age of Holstein cows was found as 68.2 months by Yaylak (2003) and as 2483 days (81.7 months) by Stevenson and Lean (1998). In this study, the fact that cattle leave the herd at younger ages could be attributed to various reasons. One of these reasons is the requirement which stipulates that the dairy cattle to be insured must be between the ages of 1 to 7 (including 7)

Table 3. Distribution of damage types in insured cattle according to the age at which the damage occurred.

Damage types	Age at which damage occurred (months)												Total	
	24		25-36		37-48		49-60		61-72		73			
	N	%[1]	N	%N	%	N	%	N	%	N	%		N	%
Involuntary slaughter	9	7.8	17	14.8	27	23.5	26	22.6	19	16.5	17	14.8	115	100
Death	3	21.4	3	21.4	2	14.3	3	21.4	1	7.2	2	14.3	14	100
Abortion	4	13.8	8	27.6	10	34.5	5	17.2	2	6.9	0	0.0	29	100
Calf death[2]	4	7.0	23	40.4	16	28.0	5	8.8	2	3.5	7	12.3	57	100
Total	20	9.3	51	23.7	55	25.6	39	18.1	24	11.2	26	12.1	215	100

[1]The ratios were given according to the sum of rows (example, 100×9:115= 7.8%).[2]Values for the dams of calves which died at birth or within seven days following birth.

Table 4. Distribution of damage types in insured cattle according to the season in which the damage occurred.

Damage types	Season								Total	
	Winter		Spring		Summer		Autumn			
	N	%[1]	N	%	N	%	N	%	N	%
Involuntary slaughter	24	20.9	26	22.6	43	37.4	22	19.1	115	100
Death	3	21.4	3	21.4	5	35.7	3	21.4	14	100
Abortion	6	20.7	4	13.8	12	41.4	7	24.1	29	100
Calf death [2]	20	35.1	17	29.8	15	26.3	5	8.8	57	100
Total	53	24.7	50	23.3	75	34.9	37	17.2	215	100

[1]The ratios were given according to the sum of rows (example, 100×24:115= 20.9%).[2]Values for the dams of calves which died at birth or within seven days following birth.

Table 5. According to herd leaving reasons (damage groups), means for herd leaving ages in cattle involuntarily slaughtered.

Damage groups for involuntary slaughter	N	%	Mean age (days)	SE	Min	Max
Udder disorders	59	51.3	1602	73.5	667	2738
Reproduction and calving problems	20	17.4	1603	126.3	642	2685
Digestive tract disorders	13	11.3	1743	156.6	748	2499
Foot and leg problems	9	7.8	1418	188.2	703	2399
Injury and other problems	14	12.2	1513	150.9	572	2605

Table 6. According to herd leaving reasons (damage groups), means for herd leaving ages in cattle left herd as a result of death.

Damage groups in cases of death	N	%	Mean age (days)	SE	Min	Max
Digestive tract disorders	6	42.9	1194	272.2	506	1924
Reproduction and calving problems	2	14.3	1700	471.4	1148	2252
Circulatory system problems	2	14.3	1284	471.4	779	1789
Respiratory disorders	2	14.3	832	471.4	523	1140
Accident and other problems	2	14.3	1671	471.4	898	2444

Table 7. According to causes of abortions and calf deaths, means for the ages of dams at the time of the damage.

Damage types	Damage groups	N	%	Mean age (days)	SE	Min	Max
	Unknown cause	26	89.7	1257[a]	68.6	646	2141
Abortion	Other	3	10.3	844[b]	202.0	672	1148

Table 7. Contd.

Calf death[1]	Calving problems	32	56.1	1267	96.7	717	2541
	Septicaemia	20	35.1	1260	122.3	709	2447
	Other	5	8.8	1454	244.6	796	2604

[1]Values for the dams of calves which died at birth or within seven days following birth.[a,b]The difference between the means of dam age at the time of abortion is significant (P<0.10).

Table 8. Least squares means for hot carcass weights in involuntarily slaughtered cattle.

Traits		N	Mean carcass weight (kg)	SE	Min	Max
Damage groups	Udder disorders	58	219	6.1	156	339
	Repr. and calving problems	19	228	10.1	163	341
	Digestive tract disorders	12	203	12.0	105	271
	Foot and leg problems	9	208	14.3	151	231
	Injury and other problems	14	193	11.3	146	236
Herd leaving age (month)	24	8	179	14.8	105	228
	25-36	17	219	10.3	169	341
	37-48	27	213	9.4	163	311
	49-60	26	214	8.6	156	315
	61-72	17	223	10.5	141	339
	73	17	214	10.5	156	336
Slaughter season	Winter (Dec.-Feb.)	23	224[a]	9.5	105	339
	Spring (Mar.-May)	26	216[ab]	8.9	146	341
	Summer (Jun.-Aug.)	41	198[b]	7.0	150	310
	Autumn (Sep.-Nov.)	22	204[b]	9.2	141	275
Overall		112	216	4.1	105	341

[a,b] For slaughter season, the difference between the means with different letter is significant (P<0.10).

(SSLLI, 2008a). Hence the data regarding the female cattle which have not been calved yet are included in the study whereas data about cows over a certain age are out of the scope. As a matter of fact, the herd leaving ages for cattle involuntarily slaughtered or died were found to be between 506 days (16.6 months or 1.4 years) and 2738 days (90.1 months or 7.5 years) (Table 2). Additionally, dairy producers might have the tendency to remove the cattle with problems from the herd earlier because of insurance guaranty.

The reason for leaving the herd for 115 (89.1%) out of 129 cattle was involuntary slaughter (Table 2). When the causes of damage in involuntary slaughter were examined, it was seen that udder disorders, and reproduction and calving problems were the first two causes with 51.3 and 17.4%, respectively, followed by injury and other problems, digestive tract disorders, and foot-leg problems (Table 5). Several studies have also found udder and reproduction problems as the first two causes within reasons for involuntary culling (Seegers et al., 1998a; Stevenson and Lean, 1998; Yaylak, 2003; USDA, 2007). In Northern Ireland and England, infertility, lameness and mastitis were reported to be the three most prevalent reasons for removal from the herd (CAFRE, 2005). On the other hand, the proportional distribution of reasons for culling might vary from country to country. Seegers et al. (1998a) reported the reasons and ratios for culling in French Holstein cows as reproductive disorders (28.5%), low milk yield (16.6%), udder problems (12.4%), other health disorders (4.6%), emergency culling (3.9%), lameness (2.7%), sales for dairy purpose (5.9%) and other voluntary culling reasons (25.4%). Stevenson and Lean (1998) indicated the reasons and ratios for culling in Holstein cows in Australia as reproductive failure (32%), udder disorders (28%), low milk production (12%), calving- associated disorders (6%), lameness (4%), surplus (2%) and miscellaneous disorders (15%). In the USA, the reasons and ratios for culling in dairy cows were reported to be reproductive problems (26.3%), udder or mastitis problems (23.0%), lameness or injury

(16.0%), poor production not related to above problems (16.1%), sold as replacement to another dairy (5.8%), other diseases (3.7%), aggressiveness or belligerence (0.7%) and other reasons (8.4%) (USDA, 2007). Yaylak (2003) determined the reasons and ratios for culling in Holstein cows in Ödemi district of Izmir province as sales for dairy purpose (40.2%), infertility (17.9%), udder disorders (16.2%), low milk yield (3.5%), calving problems (7.0%), foot-leg problems (2.2%), death (2.2%) and other reasons (10.9%).

The reason for leaving the herd for 14 (10.9%) out of 129 cattle was death (Table 2). While in some studies on the reasons for removal, deaths have been excluded (Seegers et al., 1998a), in some others, deaths were indicated as a removal reason group (Bascom and Young, 1998; Yaylak, 2003), and in others, the cattle which have died were listed according to the cause of their death and evaluated under those reasons for removal (Stevenson and Lean, 1998). The ratio of cows which left the herd as a result of death to the total number of cows left the herd was found as 13% by Bascom and Young (1998), 13% (calving disorders 6%, miscellaneous disorders 5% and acute mastitis 2%) by Stevenson and Lean (1998), and as 2.2% by Yaylak (2003). On the other hand, USDA (2008) reported the ratio of death of cows in dairy herds as 3.8, 4.8 and 5.7% in 1995, 2001 and 2006, respectively. USDA (2008) indicated the causes and ratios of death of cows in 2006 as put down due to lameness or injury (20.0%), mastitis (16.5%), calving problems (15.2%), respiratory problems (11.3%), diarrhea or other digestive problems (10.4%), lack of coordination or severe depression (1.0%), poison (0.4%), other known reasons (10.2%) and unknown reasons (15.0%).

The 13.5% of the damage reports examined were about abortion (Table 2) . The cause of abortion was generally not indicated in the reports (Table 7). Abortion in dairy cattle is described as the loss of fetus between 42 and 260 days of pregnancy (Hovingh, 2002). If the calf is born dead after day 260 of pregnancy, this condition is defined as stillbirth. Infectious agents are the most common causes of abortion, although factors, such as genetic abnormalities in fetus, heat stress, toxic agents, insemination of pregrant cows, injuries and insufficient nutrition are among the causes of abortion (Wattiaux, 1996; Hovingh, 2002). Mostly, it is difficult to determine the cause of abortion; it is only possible to establish a definitive diagnosis in 20 to 30% of especially the cases of abortions that are not due to infectious agents (Alaçam, 1997). One of the most important infectious diseases that cause abortion is brucellosis and its causal agent is a bacterium called *Brucella abortus*. The 15% of all the cattle reared in farmer conditions in Turkey is reported to have brucellosis (Özhan et al., 2007). In this case, brucellosis is one of the first causes which come to mind in abortions in Turkey. Abortions due to brucellosis usually occur between 5 and 8 months of pregnancy. The present study found that most of the abortions occurred between 4.5 and 8 months of pregnancy in cows. Other than brucellosis, bacterial (leptospirosis, listeriosis, vibriosis), viral (IBR, BVD), protozoal (neosporosis, trichomoniasis), and fungal (mycotic abortion) infections might cause abortions (Wattiaux, 1996; Içа et al., 2006). Neosporosis is shown as the most important cause of cattle abortions in recent years throughout the world.

When the cases of abortion were examined based on age groups, it was observed that the number of cases increased until the age of 48 months, and then decreased in later age groups (Table 3). Mitchell (1960) found that the number of abortion cases peaked in cows between the ages of three to five. Markusfeld-Nir (1997) found that the abortion risk in Holsteins was the lowest in heifers and the highest for second parity. One of the reasons for the change in the abortion risk depending on the parities could be the different degrees of immunity to contagious agents. In terms of cattle in the same herd, since heifers are usually kept apart from milking cows, they are generally exposed to contagious abortion agents when they join the milking herd. In this case, the abortion risk increases because they have low or no immunity to agents (Markusfeld-Nir, 1997). On the other hand, as their immunity degree increases in time and moreover the cows that had abortions are removed from the herd for this or some other reason, abortion rate appears to decrease in later ages. As a matter of fact, the ratio of cattle involuntarily slaughtered did not decrease as they get older (Table 3).

The 26.5% of the damage reports examined were about calf death (Table 2). The reason in 32 (56.1%) out of the 57 calf death cases examined in this study was dystocia due to various reasons (Table 7). These calf losses related to dystocia occurred either as stillbirth or death within the first 24 h after birth. It is stated that 75% of the causes of dystocia is related to the calf whereas 25% is related to the dam. Causes related to the dam include abnormal labor pain, narrowness of bony birth canal, and soft birth canal disorders, and those related to the calf could be listed as developmental disorders, the size of the calf, the sex of the calf, and abnormal presentation of the calf (Alaçam, 1997). Some cows could be genetically predisposed to dystocia, although the heritability of dystocia (0.05 to 0.15) is low (Wattiaux, 1996). Dystocia is more frequently observed in heifers smaller than breed average in large breeds (Özhan et al., 2007).

The 20 (35.1%) out of the 57 calf death cases have been caused by septicaemia (Table 7). Septicaemia is generally caused by bacterial infections in which disease-producing microorganisms or their toxins enter the blood. In many cases of septicaemia, inadequate intake of colostrum is observed (McGuirk and Ruegg, 2009). Moreover, inadequate levels of immunoglobulins in the colostrum of first calvers might increase the calf deaths (Wattiaux, 2008). The main conditions of protection from

septicaemia include a hygienic environment during and after birth, proper disinfection of the umbilical cord stump, and allowing the calf to drink appropriate amounts of colostrum in a timely manner. The present study found that dams of 40.4% of calves died were between the ages of 25 to 36 months (Table 3) . The high ratio of calf deaths with cows calving in this age group could be attributed to facts that many of the first calvings occur in this age group, that less immunoglobulins are present in the colostrum of young calvers, that necessary care to select semen is not given, and that parturitions are intervened inappropriately and early.

It was determined that involuntary slaughter, death and abortions occured more frequently during the summer while calf deaths were more common in winter (Table 4). Based on their observations, veterinarians in the region covered in this study also indicate that diseases are mostly seen in winter and summer. Seegers et al. (1998a) examined the seasons of culling in Holstein cows in periods of two months and indicated that culling rates were the highest in December-January and October-November periods as 20.8 and 18.6%, respectively, and the lowest in April-May as 13.9%.

The mean hot carcass weight in involuntarily slaughtered cattle was 216 kg (Table 8). The average carcass weight of 309 kg in French Holstein cows as determined by Seegers et al. (1998b) is higher than our finding.

CONCLUSION

With the help of the state-supported livestock insurance, having taken effect in Turkey, it will be possible for producers to meet certain standards in topics such as housing, nutrition, management, and health protection, to produce better quality and healthier products, and to reduce losses. As a matter of fact, according to State Supported Livestock Life Insurance Technical Conditions, Tariffs and Instructions (SSLLI, 2008a), certain conditions (example, to ensure suitable physical conditions for places where cattle is kept, to administrate certain vaccines, to make cattle swallow magnet, and to control internal and external parasites) must be met before cattle can be insured. In addition, producer is responsible for taking necessary precautions to prevent, decrease or alleviate the damage in case of the risks materialize (SSLLI, 2008b). Because it is for the benefit of both the country and the producer, producers should be informed about state- supported livestock insurance and encouraged to take out a policy. Agricultural insurance, albeit not a panacea for all the problems of the sector, is a practice which could help with the healthy development of the agricultural sector.

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