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An evaluation on the current state of water buffalo breeding in Diyarbakır, identification of problems and solutions

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Abstract
The present study aimed to determine the current state of water buffalo breeders in Silvan, Bağlar, Yenişehir, and Sur counties of Diyarbakır province in Turkey, and to reveal the aspects of shelter, grazing, calf breeding, brood use, meat and milk production practices, care and health protection, expectations from breeding practices and current problems. The results of the face-to-face surveys were used carried out with a total of 147 business owners engaged in water buffalo breeding in four counties. In the research, the average number of water buffaloes per farm was determined to be 11.03. The breeders have reported that they continue to raise water buffaloes for reasons such as making a living, high quality of water buffalo milk, and benefiting from the available subsidies. The average lactation period of water buffaloes was 7.1 months, the average daily milk obtained per animal was determined to be 3.63 liters. The milk obtained is mostly evaluated as yogurt, cheese, and butter. As a result, it was determined that almost all of the breeders are satisfied with water buffalo breeding, they see breeding as a family profession, and they are aware of the quality and importance of water buffalo products.

Keywords
Anatolian Water Buffalo, Cattle, Diyarbakir, Breeding

Introduction
Water buffalo is a species that has economic value unique to the region in many parts of the world. Quality milk and dairy products add a special value to the water buffalo. Water buffalo is highly resistant to natural conditions and diseases, has a high feed conversion ability, can convert poor quality roughage into meat and milk, which is very important in human nutrition, and its breeding costs are lower than cattle breeding, comprising the important advantages of water buffalo breeding (Canbolat, 2012).

Water buffalo is much more suitable especially for pasture livestock, as it does not choose feed and has the high conversion ability for roughage better than other ruminants. Water buffalo can make good use of the diseased pastures that cattle and sheep cannot benefit from. They can easily adapt to their environment and enjoy rolling in wet and muddy areas (Williamson and Payne, 1968; Fisher, 1975).

Water buffalo milk has high values especially in terms of protein, fat, and lactose ratio compared to other milk-producing species. The high-fat content makes it more preferred in making yogurt, cheese, and butter. It is sold at higher prices compared to cow's milk due to its better efficiency and taste in cheese and yogurt production. In Turkey, products such as lüle kaymağı (a traditional cream), Afyon cream, confectioneries, dairy desserts, ice cream, and butter are produced from water buffalo milk (Atasever and Erdem, 2008). The famous Italian Mozzarella cheese is obtained from water buffalo milk (Uslu 1970, İlaslan et al. 1983).

Carcass yield in water buffaloes is lower than that in cattle (Akdağ, 2004). However, water buffaloes have important advantages such as being able to benefit from

low-quality roughage and high feed conversion ratios, high resistance to difficult climatic conditions and diseases, and finding buyers for their products at higher prices. The unique structures of meat and milk obtained from water buffalo (meat contains low fat and cholesterol, milk contains high fat) give intense consistency and flavour to foods such as sausage, cheese, yogurt, and cream. However, in Turkey, the potential for organic breeding of water buffalo meat and milk and geographical is very high. Due to its thickness, water buffalo leather is in the industry as bag and furniture leather (Özkan et al., 2017).

The water buffaloes that exist and are cultivated in Turkey have originated from the Mediterranean water buffalo, a subgroup of the river buffalo, and are also called the Anatolian Buffalo (Soysal et al., 2005).

Translated as "water cattle" in Turkish, water buffalo is also called by different names such as Camız, Camış, Donbey, Kömüş, and Gameş depending on the regions where it is raised (Sarıözkan, 2011; Tatar, 2020).

India, Pakistan, China, Nepal, Egypt, Myanmar, the Philippines, and Vietnam are listed as the leading countries in terms of water buffalo presence in the world. While India accounts for 53.76% of the world's current water buffalo stock, it accounts for 86.7% of the water buffalo stock raised together with Pakistan and China (FAOSTAT, 2020).

Water buffalo breeding has attracted a lot of attention in Turkey in recent years. In addition to the subsidies and incentives given to water buffalo breeding, the number of water buffaloes in Turkey has been increasing gradually, with the demand of consumers for products obtained from water buffalo milk relatively increasing. With the 'Anatolian Buffalo Breeding Project in the Hands of the Society', established in Turkey in 2009, a regular increase has been observed in the number of water buffaloes since 2010 (Turkstat, 2021).

Samsun in the North Anatolian Region, Kayseri in the Central Anatolian, Tokat in the northern coastal areas, İstanbul and Balıkesir in the Marmara Region, Bitlis, Muş and Sivas in the East Anatolian Region, Diyarbakır in the Southeast Anatolian Region and Afyonkarahisar in the Aegean Region are the provinces where water buffalo breeding is carried out intensively in Turkey (Turkstat, 2021).

According to the TURKSTAT 2021 data, there are a total of 185,574 water buffaloes in Turkey. Samsun is the province with the highest number of water buffaloes in Turkey with 23 633 animals. Samsun is followed by Diyarbakır with 15 914 animals, Istanbul with 15 598 animals, Tokat with 10 846 animals, Bitlis with 10 123 animals, and Muş with 7 591 animals (Table 1).

Table 1. Water buffalo assets by Province in Turkey

Province	Water buffalo asset
Samsun	23633
Diyarbakır	15914
İstanbul	15598
Tokat	10846
Bitlis	10123
Muş	7591
Kayseri	7528
Afyonkarahisar	7137
Balıkesir	5475
Sivas	5363

The present study aimed to make an evaluation on the general characteristics, shelter conditions, grazing, and shepherd use, herd management, calf breeding methods, brood use, meat and milk production practices, health protection and expectations and problems of breeders in the counties of Diyarbakır, where the water buffalo asset is intense.

Materials and Methods

In the present study, data obtained from face-to-face surveys with a total of 147 business owners in 19 villages of Bağlar, Yenişehir, Sur, and Silvan counties, where water buffalo breeding is intense, were used. The surveyed businesses were selected from those that are not members of the Anatolian Buffalo Breeding Project in the Hands of the Society. The survey applied to the breeders consisted of a total of 121 questions.

Table 2. Counties surveyed and the number of surveys conducted

County	The Number of Surveys
Bağlar	42
Sur	20
Silvan	69
Yenişehir	16
Total	147

Table 3. The number of water buffaloes owned by the surveyed counties and businesses

County	Silvan	Sur	Yenişehir	Bağlar
Total (n)	5107	1988	1710	1600
Business (N)	717	116	171	606

The water buffalo assets of the districts where the research was conducted constituted 62.2% of the Diyarbakır water buffalo asset. According to the districts of Bağlar, Silvan, Sur, and Yenişehir, the water buffalo assets in the surveyed businesses were 14.0%, 5.8%, 10.0%, and 37.9%, respectively. In other words, although it varied from district to district, it was seen that the surveyed districts constituted 15.5% of the total water buffalo existence. Considering that the study was carried out in businesses outside the scope of the "Anatolian Buffalo Breeding Project in the Hands of the Community", this ratio was substantial.

The survey was carried out in the form of filling out the questionnaire with face-to-face interviews with the breeders between August and October 2018.

The survey questions were handled under seven main titles regarding water buffalo breeding.

1. Information on Breeders and Businesses
2. Shelter Status
3. Information on Utilization of Pasture and Shepherd Use
4. Calf Raising and Brood Use
5. Meat and Milk Production Practices
6. Care and Health Protection Practices
7. Expectations and Problems of Breeders

The IBM SPSS statistical 24.0 package program was used in the evaluation of the data. The obtained data were first entered into the Excel package program. Then, descriptive statistics, frequencies, and percentage values were used in the evaluation of the data.

Results and Discussion

Information on the Farmers and Enterprises

In the present study, 92.5% of the breeders participating in the survey were male while 7.5% were female. It was determined that 57.1% of the breeders were primary school graduates, 21.8% were secondary school graduates, 15% were high school graduates and 2.7% were college graduates. It was determined that 3.4% of the breeders participating in the survey were illiterate. The fact that the active population, which is the source of the workforce, was between the ages of 15 and 64 was also an indication that the family workforce potential is quite high in the businesses studied. Yılmaz (2013) have reported that water buffalo breeders were mostly between the ages of 41-50 and that there were not many breeders older than 60 years and younger than 30 years old. Kaptan (2019) has stated that breeders were generally over 61 years old and that the number of breeders under 30 years of age was very low.

The average number of individuals per business was determined to be 8.73. This value was considerably higher than the household average of Turkey of 3.4 and the household average of Diyarbakir of 4.97. Işık (2015) have reported the average population per business as 6.68 while Yılmaz (2013) determined the average population per business to be 11.

It was determined that the breeders participating in the survey have been breeding water buffalo for an average of 18.18 years. It was determined that 11.5% of the farmers have been carrying out breeding for five years or less, 15% of the farmers have been breeding for 6-13 years, and 73.5% of the farmers have been breeding for 13 years or more. This ratio is an indication that water buffalo breeding is a family profession. Özger (2018) determined the active breeding period of the breeders to be 26 years.

Of the breeders participating in the survey, 69% stated that they do cattle breeding with water buffaloes. The ratio of those who breed sheep with water buffalo was 13% and the ratio of those who breed goat with water buffalo was 5%. The ratio of businesses engaged in sole water buffalo breeding was determined to be 13%. It was determined that 22% of the breeders did not own the land. While the land assets between 25 and 50 decares were 16%, those between 51 and 100 decares were 23%, those between 101 and 200 decares were 11%, those between 201 and 400 decares were 24%, and the ratio of businesses with 400 decares or more was 4%. The average land assets of businesses that own the lands were calculated as 174.9 decares. While the average dryland per business was 133.4 decares, the irrigated land ratio was 136.35 decares. Işık (2015) has reported the average land size per farm as 26.26 decares while Avcı (2015) as 144.8 decares. The average land size obtained in the present study was found to be higher than the specified values.

While 67.2% of the breeders participating in the survey had 10 or fewer water buffaloes, the average number of water buffaloes per farm was determined to be 11.03. Also, it was determined that they have an average of 6.36 water buffaloes, 2.36 bulls, 2.35 male calves, and 2.22 female calves per farm. In their study, Çiftçi and Yılmaz (2019) determined the average number of water buffaloes per farm as 8.84. Işık (2015) has reported that the number of water buffaloes per farm was 10.11, an average of 1.29 male water buffaloes, 4.95 female water buffaloes, 1.69 male calves, and 2.18 female calves per farm. Yıldız et al. (2021) have reported that the average water buffalo assets per farm were 9.33.

Shelter Status of Businesses

All the breeders have stated that they raised their water buffaloes in their barns in the village. While 32% of the breeders only kept water buffalo in their barns, 68% reported that they kept water buffalo and cattle together.

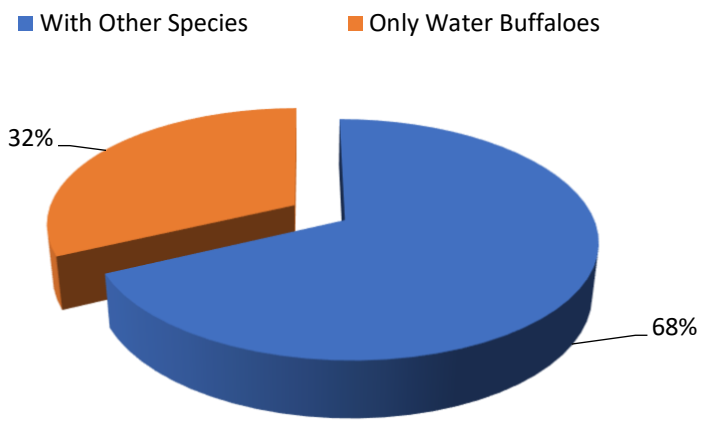

Figure 1. How animals benefit from shelters in businesses

It was determined that 35% of the barns in the businesses were located under the houses of the breeders, while 24% were adjacent to the houses and 41% were independent of the houses. Altınbaş (2003) has stated that 52% of the shelters were under the breeders' houses, 44% were independent of their houses and 4% were adjacent to their houses. It was determined that all the independent shelters had closed tied stalls. In 82% of the barns, the floor consisted of reinforced concrete, while in18% consisted of soil. Avcı (2015) have reported that all of the breeders had a concrete barn floor and emphasized that even if the concrete coating increases the cost of the building, it is important in terms of hygiene. Similarly, Altınbaş (2003) have reported that all the barn floors of the businesses were reinforced concrete.

While 71.4% of the breeders preferred brick-briquette as the wall material in their businesses, 17% preferred adobe, 10.89% stone, and 0.71% wood material. The ratio of those using tiles as the shelter roofing material was 73%, the ratio of those using wood was 9% and the ratio of those using soil was determined to be 18%. Altınbaş (2003) determined that 34.6% of the shelter roofing materials of the farms are made of tiles, 28.4% of wood, 1.2% of soil, and 35.8% of material obtained from zinc. Avcı (2015) reported in his study that wooden materials were used in all the shelter roofs of the farms owned by the breeders.

One of the most important problems of closed shelters is ventilation. In the research, 80% of the enterprises do not have ventilation shafts. It was determined that there are an average of 1.64 ventilation shafts in the shelters with ventilation shafts. While the ratio of the number of farms with 5 or less than 5 windows in the barns of the breeders was 89.8%, the ratio of the farms with 5 or more windows was 14.3%. The number of windows per establishment was calculated as 3.2. Since the type of windows is not suitable for measuring, their measurements could not be taken. Altınbaş (2003) stated that the ratio of businesses with ventilation shafts was 13.8% and the average number of chimneys per business was 1.64.

Of the breeders, 10.2% provided water for their water buffaloes only from the fountains in the village, 11.6% from fountains and streams, 34.7% from fountains and rivers, 9.5% from fountains and wells, 1.4% from rivers and wells, and 32.7% have stated that they benefited from fountains, rivers, and wells for their water needs. Altınbaş (2003), in the survey conducted with water buffalo breeders in Bartın province, has reported that the businesses benefited from the fountains in their courtyards as the source of water.

Of the breeders who participated in the survey, 68.7% stated that they preferred plastic containers, 24.5% metal, and 6.8% concrete containers. Altınbaş (2003) stated in his study that 7.5% of the breeders prefer metal buckets, 2.5% wooden buckets, 1.3% concrete, and 88.7% plastic buckets. It was determined that the breeders preferred 73.5% concrete, 12.9% metal, 8.8% plastic, and 4.8% wooden feeders as the material.

Information on Utilization of Pasture and Shepherd Use

In the study, all of the breeders declared that they benefited from the village common pasture for feeding their water buffaloes. While 97.3% of the breeders who participated in the survey have reported that they grazed their water buffaloes in the pasture with other animal species, 2.7% of the breeders have reported that they took their water buffaloes out as a single herd in the pasture. Altınbaş (2003) has reported that the ratio of the breeders who do not graze their water buffaloes with other species was 35%, and the ratio of those who graze with other species was 65%. In the districts where the present survey was conducted, the annual average duration for the water buffaloes for pasture utilization was calculated as 10.36 months. Altınbaş (2003), in the study conducted in the province of Bartın, determined that the water buffaloes in the region benefited from the pastures for 6.6 months. In their study, Çiftçi and Yılmaz (2020) determined the annual average duration for the breeders for rangeland utilization as 1-2 months, 3-6 months, and 7-8 months, and determined the utilization rates from the pasture as 0.00%, 66.91%, and 33.09%, respectively. Kaptan (2019) has reported that 42% of the breeders benefited from the pasture for 7-8

months, and 55% for 9 months or more. The same researcher has also reported that more participation was achieved in the 3-6 months rangeland utilization period in their research and that they had at least 6 months or more pasture utilization period.

In this study, 89.1% of the breeders have stated that they preferred to use a shepherd for their water buffalo care and pasture grazing needs whereas 10.9% have stated that they did not find it necessary to use a shepherd. It was determined that 23.7% of the farms where shepherds were used, one of the family members performed the shepherd's job whereas in 76.3% they employed the shepherd outside the family members.

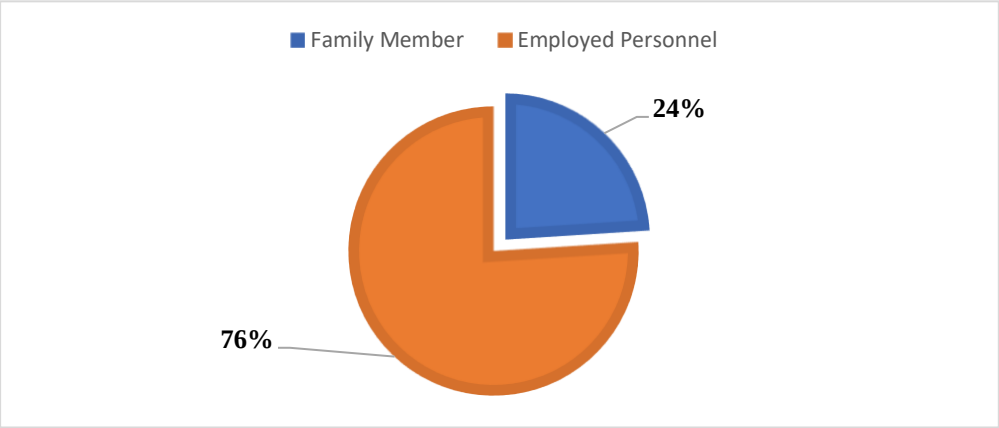

Figure 2. The shepherd employment status in the businesses

While 34.3% of the breeders who participated in the survey have stated that the number of shepherds used in the businesses was 1, 29.8% have stated that the number of shepherds was 2, and 35.9% have stated that the number of shepherds used in the businesses was 3.

Breeding and Milking

The reproductive cycle in water buffaloes is different from that in cattle. The answers received from the questions asked to the breeders on this subject were that 87.8% of the breeders stated that the gestational period of their water buffaloes was 10 months while 10.2% stated 10.5 months and 2% stated 11 months. Altınbaş (2003) reported the gestational period of water buffaloes as 323.5 days (approximately 11 months) according to the answers received from the breeders in the survey carried out with water buffalo breeders in Bartın. Şekerden (2001) has stated that the average gestational period in water buffaloes was 315 days (308-321 days).

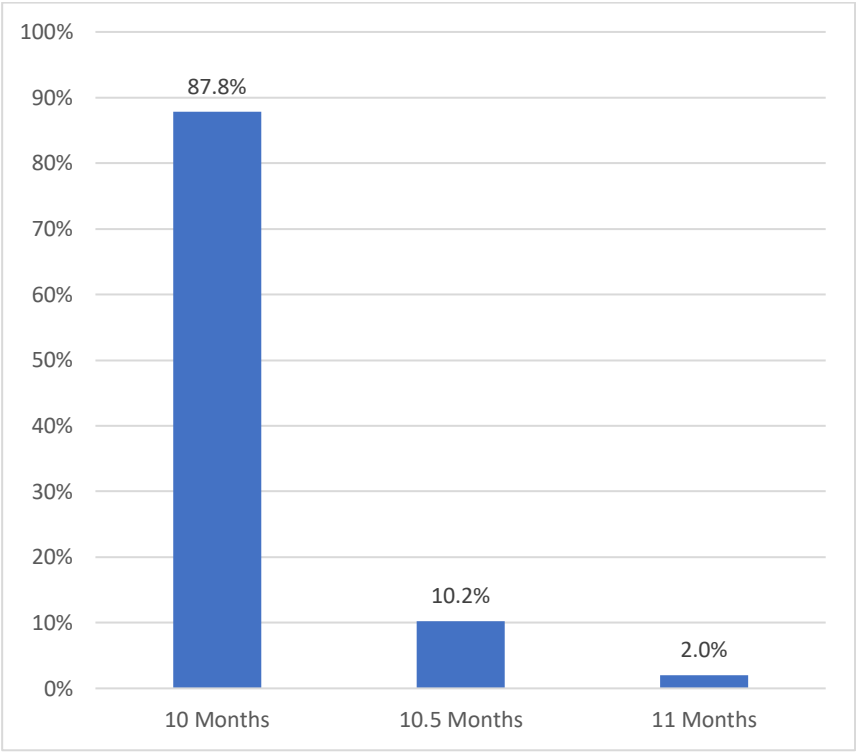

Figure 3. Responses regarding the gestational period of water buffaloes

In terms of umbilical cord care, one of the first interventions to the pup after birth, it was determined that 13.6% of the breeders cut the umbilical cord of the calves whereas 86.4% did not cut the umbilical cord after birth. It was determined that the milking performed in all the businesses participating in the survey was carried out by the women in the family. Hand milking was carried out in all the businesses. Özger (2018), in their study on "the Economic Analysis of water buffalo Breeding Activity" in Iğdır province, has stated that 94.6% of the animals were hand milked in the businesses surveyed. Kaptan (2019) has stated that 94% of the breeders surveyed reported that milking was done by their spouses, 3% by their children, and 3% by the workers employed.

The mean weaning age of calves was determined to be 4.96 months, the earliest weaning age was 1 month, and the latest weaning age was 12 months. In the present study, it was found that 22.4% of the breeders wean their calves in 3 months or less than 3 months, 68.7% wean their calves between 4-6 months, and 8.9% wean their calves in 7 months or more. Altınbaş (2003) determined that the average age of weaning of calves in businesses was 4.9 months. This result was similar to the data obtained in the present study.

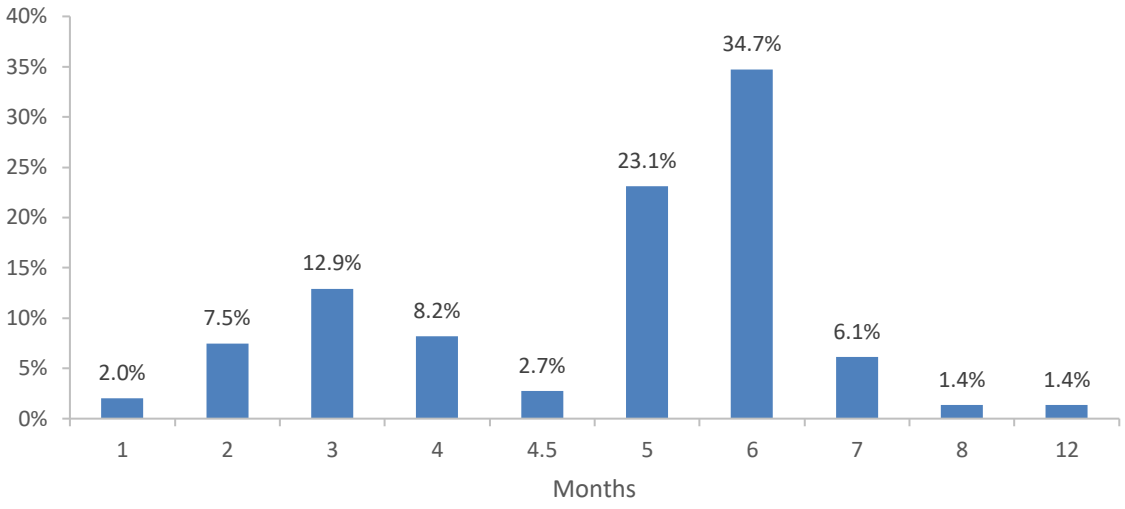

Figure 4. Weaning times in calves

It was determined that the period of feeding the calves for the first time after birth was between 3 days and 3 months in the surveyed businesses. Since the milk yield of water buffalo cows is low, calves drink milk for varying periods depending on the farm. Of the breeders included in the survey, 20.4% have reported that they started full milking of water buffaloes 3 days after birth, 62.6% 1 week after birth, and 17% 1 month after birth. Altınbaş (2003) has reported that the calves were fed for the first time 43 days after birth.

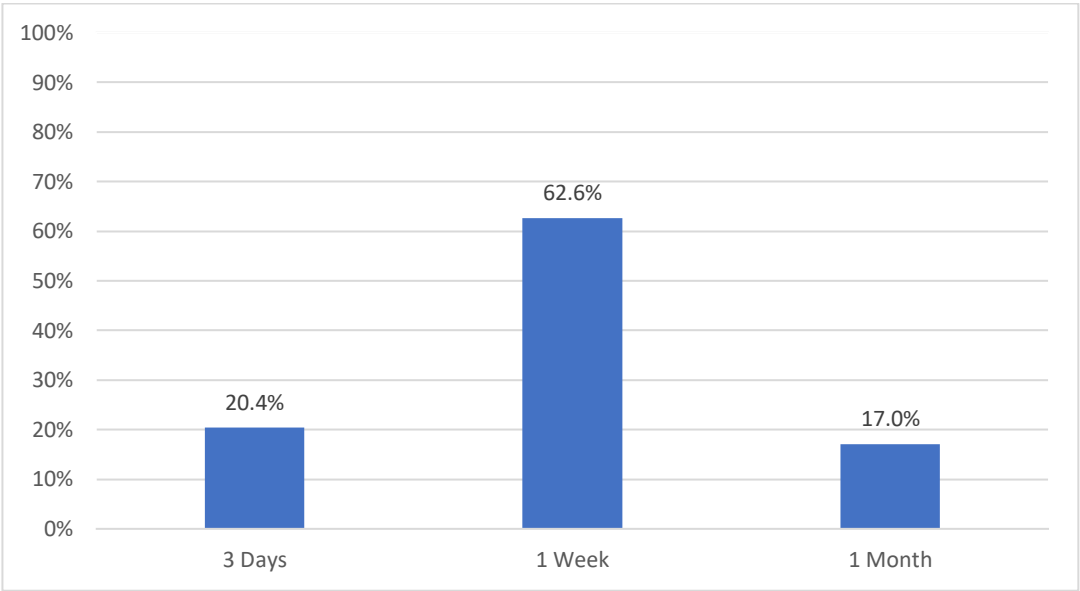

Figure 5. The onset of full milking in businesses

Of the breeders, 17% have stated that the lactation period of their water buffaloes was 6 months, 50.3% 7 months, 28.6% 8 months, and 4.1% 9 months during a lactation period. The mean lactation period was calculated as 7.1 months. Altınbaş (2003) determined the average lactation period in businesses as 6.3 months. Kaptan (2019) has reported that 64% of the breeders surveyed stated that the lactation period was 180-200 days while 36% stated 210-270 days.

In the present study, during the lactation period, 5.4% of the breeders stated that they carry out milking once a day whereas 94.6% stated that they applied two milkings a day. Bayram (2016), in their study in Samsun, determined that 69.2% of the farms milked once a day whereas 30.8% milked twice a day.

While 84.4% of the breeders have stated that they cleaned the udder before or after milking, 15.6% have stated that they did not clean the udder. Of the breeders that clean the udder, it was determined that 84.7% of the breeders cleaned the udder before milking, 2.4% after milking, and 12.9% both before and after milking. Özger (2018) has stated that 96.7% of the breeders carry out udder cleaning whereas 3.3% do not. Of the breeders, 26.5% have reported that they did not feed during milking whereas 73.5% have reported that feed during milking.

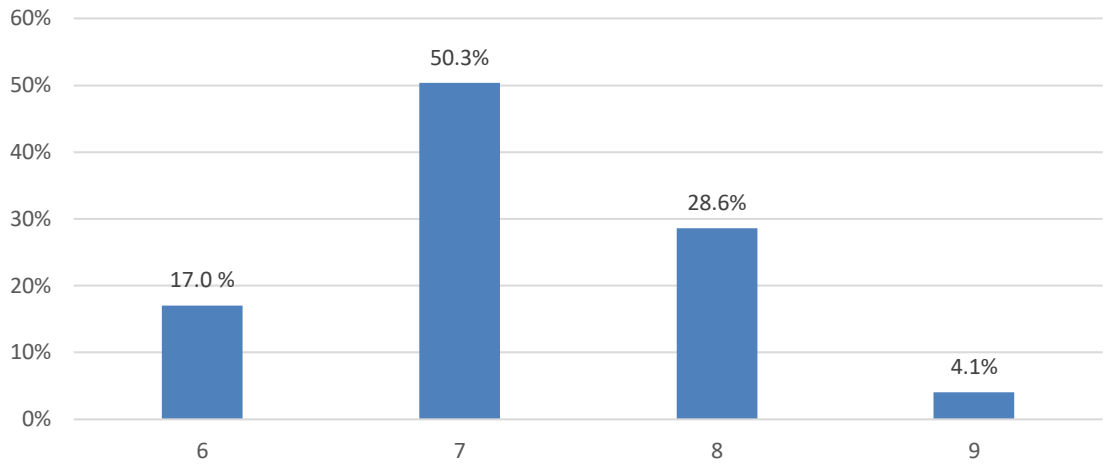

Figure 6. Lactation duration of water buffaloes

Of the breeders participating in the survey, 17.7% have reported that they used female water buffaloes for the first time at the age of 18 months, 48.3% at 24 months, 17.7% at 30 months, and 16.3% at 36 months for breeding. Regarding the age to use males for breeding for the first time, 38.1% of the breeders have stated 18 months, 53.7% 24 months, 2.7% 30 months, and 5.4% 36 months.

Since the Anatolian buffalo is a late-developing breed, the breeding age also occurs later. While the young water buffalo's participation in the herd is two years old for females, it reaches 18 months for male water buffaloes. In the present study, the average breeder selection age of the owners was calculated as 1.9 years. It was determined that 32% of the breeders set the brood selection age as 1.5 years, 59.9% as 2 years, 2.7% as 2.5 years, and 5.4% as 3 years. Altınbaş (2003) found the average age for breeding water buffaloes to be 24.3 months for males and females. Çiftçi and Yılmaz (2019) have reported that 27.21% of the breeders stated the average age for breeding water buffaloes as 18-22 months, 30.15% as 23-24 months, and 42.65% as longer than 25 months. In the present study, it was determined that 83% of the breeders met their breeding animal needs from their herd, while 17% meet their breeding animal needs from outside. Altınbaş (2003) has reported that 5% of the breeders supplied their breeding animals from their herds, 42.5% from outside, and 52.2% from both outside and their herds. Regarding the question, "What are the important selection criteria for male breeder selection?", 87.7% of the breeders listed the physical appearance, 93.9% the height at the withers, 36.1% color, 21.8% shank thickness, 7.5% rump width, and 1.4% suitable animal prices. Altınbaş (2003) determined that the breeders' male brood selection was made by looking at their body structure, horn, nose, leg, tail structure, short tail, and neck structures. Regarding the question, 'What are the important selection criteria in the selection of female broods?', 66% of the breeders listed the physical appearance, 21.8% height at the withers, 40.1% color, 6.1% shank thickness, 2.7% rump width, 32.7% milk yield of the animal's mother, 81.6% the animal's mammary gland size and 1.4% as the state of having horns. Altınbaş (2003) determined that female brood selection has been made by examining udder, horns, body structure, long tail, and ear structures. Of the breeders, 15% have stated that they feed their non-brood female and male animals for fattening, 95.5% have stated that they sold them to breeders, 2% have stated that they fed them as sacrificial, and 15% have stated that they sold them as broods. Altınbaş (2003), in the survey conducted with water buffalo breeders in Bartın province, has reported that 40.3% of the breeders feed their non-breeding female and male animals for fattening, 27.3% sell them to the breeder, 1.3% have stated that they fed them as sacrificial, and 31.1% sell them as broods. In the study conducted in Afyonkarahisar, Yılmaz (2013) determined that 47% of the breeders sell their brood water buffaloes after weaning, 37% slaughter immediately, 20% breed and feed them until they die, and 10% breed them for a few years and then slaughter them.

Meat and Milk Production

Of the breeders, 60% have stated that they did not pay attention to the onset of the fattening time of their water buffaloes, 15% of the breeders have stated that they worked with animals aged 12 months, 10% 18 months, and 5% 24 months old. Of the breeders, 40% have reported that they fatten water buffaloes with a live weight of 200-300 kg. While 55% of the breeders pay attention to the fattening period, 40% of the breeders who pay attention determined the fattening period as 4-6 months, and 60% determine the fattening period between 8 and 10 months. Of the breeders, 46% have stated that they ended the fattening at 350-400 kg body weight, 38% at 450-500 kg body weight, and 16% at 600-650 kg body weight. Altınbaş (2003) has stated that the average age of the onset of fattening was 2.5 years, the weight of the water buffaloes was 250 kg per fattening, the average fattening period was 6 months, and the weight at the end of fattening was 400 kg.

While the ratio of those who sold the animals, they fattened at the end of the fattening was 85%, the ratio of those who stated that they consumed the meat of the slaughtered animals themselves was 15%. All the breeders have stated that they did not evaluate the skin and horns obtained from the animals after slaughter. The average milk yield per animal in the farms was determined to be 3.63 liters/day. While the milk volume taken from an animal in businesses was 2 L minimum, the highest milk yield was 6 L. Altınbaş (2003) determined the average daily milk yield per water buffalo during the lactation period in businesses to be 4.13 kg.

Examining Table 4 is examined, it is seen that 73.4% of the businesses produce 4 L or less milk per animal per day, while 26.5% produce more than 4 L of milk.

Table 4. Daily milk yield of water buffaloes in farms (on the date of the survey was held)

Milk Yield	Frequency	Percentile (%)
2.0	8	5.4
2.5	12	8.2
3.0	52	35.4
3.5	3	2.0
4.0	33	22.4
4.5	13	8.8
5.0	24	16.3
6.0	2	1.4
Total	147	100.0

It was determined that 96.6% of the breeders used the milk obtained from water buffaloes for family needs, 36.1% sold the milk in the market, and 1.4% sold the milk to the merchants. While 75% of the breeders selling milk in the market sell both water buffalo and cow milk, 25% of the breeders sell only water buffalo milk in the market. Of the breeders, 7.4% stated that they evaluate the cream of milk separately. It was determined that the breeders processed the milk they obtained into yogurt (100%), cheese (98%), and butter (81.6%). Altınbaş (2003) has stated that 21.7% of the breeders process their water buffalo milk into yogurt, 3.3% into cheese, and 75% into both yogurt and cheese, and 76.5% have stated that they sell both of their products in the markets themselves.

Care and Health Applications

Of the breeders, 43.5% prefer to give their water buffaloes a body bath and 89% prefer to give their water buffaloes a foot bath. Altınbaş (2003) has stated that the breeders gave their water buffaloes a body bath. In the same study, it has been reported that only 1.3% of the breeders gave their water buffaloes a footbath. This result differs from the data obtained in the present study and reveals that water buffalo breeders in Diyarbakır give importance to the footbath.

While 93% of the breeders participating in the survey stated that they disinfect their water buffalo barns, 7% of the breeders stated that they do not disinfect their barns. All the breeders who carry out disinfection use the calcination method as the disinfection method in the barns. Majority of the businesses (93.9%) combat internal and external parasites for their water buffaloes. It was determined that foot and mouth disease (98.6%) and lice (17.7%) are the most common diseases seen in farms. Çiftçi and Yılmaz (2020) have stated that 77.21% of the businesses encountered parasites and foot and mouth disease, 8.82% encountered parasitic diseases, brucella, and foot and mouth disease, and 13.97% encountered digestive system problems, parasites, foot, and mouth disease and strokes. Özger (2018) have reported that, in Iğdır, the most common diseases in businesses were 65% foot and mouth disease, 17.5% foot and mouth disease and smallpox, and 10% foot and mouth disease and jaundice.

Regarding the question, "From whom do you get information about diseases?", 18.4% of the breeders have responded that they benefit from their own experience, 44.9% from veterinarians, 0.7% from agricultural engineers, 34.7% from both their own experience and veterinarians and 1.4% from both veterinarians and agricultural engineers. Çiftçi and Yılmaz (2020) have reported that 11.76% of the breeders administer the drugs according to their own experience, 83.09% consult a veterinarian, and 5.15% of the breeders administer the drugs according to their own experience and consult a veterinarian.

Data on Expectations and Problems of Farmers

While 79.6% of the water buffalo breeders who participated in the survey answered, 'Livelihood for the Family' as the reason for raising water buffalo, 42.2%

responded as 'Milk Quality', 5.4% as 'Hobby Purposes', 2% as 'Family Profession', 6.8%' as 'for Utilizing Subsidies', and 1.4% as 'For Meat'. Özdemir and Özdemir (2016) in their survey study in Bingöl province, have reported that 29% of the water buffalo breeders have stated they breed water buffaloes for meeting the daily needs of the household, 24% for family occupation, 13% for adapting to geographical conditions, 12% for their love for animals, 9% for earning their livelihood, 7%, for benefiting from subsidies, 5% for being their only source of income, 1% for having being trained in the profession, and %1 for having delicious products.

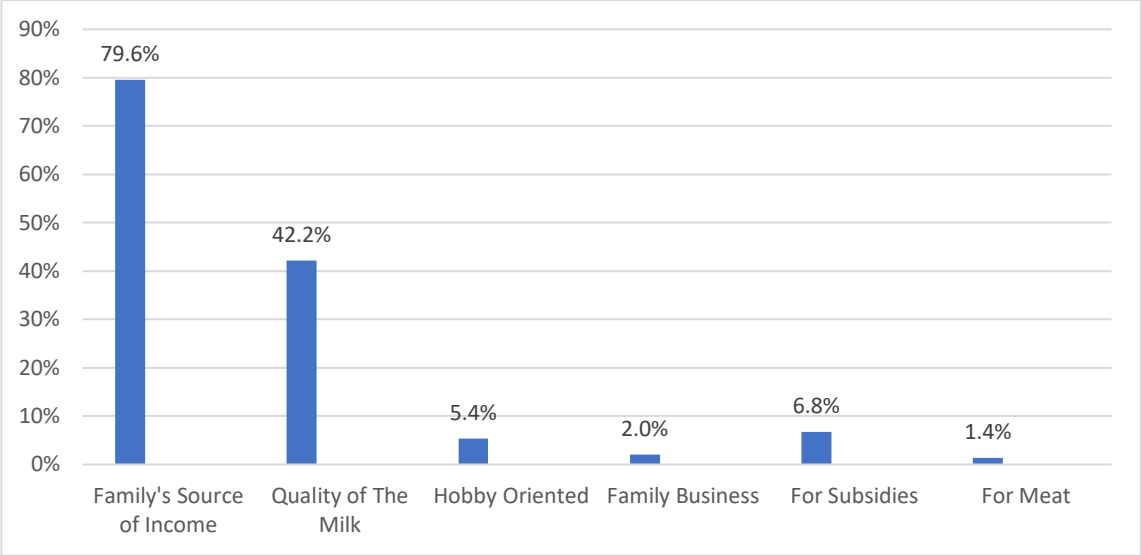

Figure 7. Reasons of breeders for breeding water buffalo (%)

While 51% of the breeders have stated that the current number of water buffaloes in their region has been decreasing and that will gradually decrease, 49% of the breeders think that the current number of water buffaloes in their region has been increasing and will increase over time. Regarding the question for the decrease in the number of water buffaloes in their region, 77.3% of the breeders have stated that the subsidies were not sufficient, 4% have stated that the water buffaloes were difficult to maintain, 8% have stated that they had low yields, 44% have stated that the pasture lands were not sufficient, 17.3% have stated that the feed costs were high, 2.7% have stated that the water buffaloes have a long gestational period and 2.7% of the breeders have stated that the Breeder Water Buffalo Breeders' Association does not accept membership. Regarding the reasons for the increase in the number of water buffaloes in their region, 81.9% of the breeders have stated that they had the opportunity to benefit from the existing subsidies, 6.9% have stated that the adaptation of the water buffalo to the region was easy, 13.9% have stated that the milk quality of the water buffalo was high, and 2.8% have stated that the water buffalo breeding contributed to the family's livelihood. Regarding the question, "In which subjects would you like to have more information?", 70% of the breeders have stated that they would like to have more information about benefiting from the existing subsidies, 15% have stated that they wanted to learn about animal health and 15% wanted to learn about farming practices. While 53.1% of the water buffalo breeders participating in the survey have been considering expanding their existing businesses, 46.9% have stated that they did not plan to expand their existing businesses. Regarding the reasons, of the breeders who plan to expand their businesses, 51.3% have stated that they wanted to benefit from the subsidies, 12.8% wanted to increase their income, and 7.7% wanted to produce more milk. When asked about the reasons of the breeders who do not plan to expand their existing business, 34.2% of the breeders found the barn capacity insufficient, 13.7% found the current operating capacity sufficient, 9.6% found the breeding costs high, 4.1% have mentioned low animal sales prices, 15.1% have stated that there was a shortage of caregivers, 20.5% have stated that the subsidies were not sufficient and 2.7% have stated that the water buffaloes had low yield.

Conclusion

The low average number of water buffaloes per farm and the small barn capacities in the surveyed businesses cannot meet the high input prices in the businesses. Breeder organizations should assist their members in providing more affordable inputs. Increasing the operating capacity and modern water buffalo breeding should be encouraged, and resources should be provided to water buffalo breeders through banks or Agricultural Credit Cooperatives. The low productivity of the region's water buffalo breeds affects the milk and carcass production volumes. Breeding studies that will increase yield should be carried out effectively and breeders should be included in these breeding studies. To promote and market the products obtained from water buffalos, branding should be encouraged through organizations such as cooperatives, unions, etc. Promotional advertisements can be carried out in the media for the dissemination of breeding and the demand for water buffalo meat, milk, and products. Training should be provided to breeders on water buffalo care,

health, and breeding by union employees or engineers, and the shortcomings of traditional methods should be eliminated. The state should increase and maintain the existing subsidies for water buffalo breeding, provide inspections on subsidies and do the necessary work to inform the breeders about the developments related to the subsidies. Water buffalo breeding should be encouraged by presenting programs to encourage young entrepreneurs and engineers.

Compliance with Ethical Standards

Conflict of interest

The authors declared that for this research article, they have no actual, potential, or perceived conflict of interest.

Author contribution

This study is derived from Murat TURAN's master's degrees thesis. The author read and approved the final manuscript. The author verifies that the Text, Figures, and Tables are original and that they have not been published before.

Ethical approval

Not applicable.

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Data availability

Not applicable.

Consent for publication

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