Influence of husbandry conditions on animal welfare at cattle farms in Turkey

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The aim of this study was to analyse husbandry conditions in terms of their impact on animal welfare at beef and dairy cattle farms and the perceptions of cattle producers in the Malatya province of Turkey. A total of 172 cattle farms altogether rearing about 12 thousand cattle were investigated in three administrative districts with the highest numbers of farms in the province, selected using a randomised sampling method. The survey forms developed by the Agriculture and Rural Development Supporting Agency [ARDSA 2015] were used in this study. Volunteer-based face-to-face interviews were conducted with these breeders. Additionally, farms were visited to evaluate the suitability of their livestock husbandry conditions. The statistical analysis included the counts and percentage frequencies (%) measured for each question answered in the survey. Husbandry and housing conditions in cattle farms were observed to be insufficient with regard to some of the parameters evaluated. To solve the identified problems, priority should be given to the education of farm workers, official control and surveillance operations should be established, while the adaptation of farms to ensure optimal animal management conditions should be considered as an important criterion in animal support programmes.

Appropriate rearing conditions for farm animals should be adjusted to their species and breed [Broom 1991, OIE 2008]. Animals that are raised appropriately for their breed and species are healthy, comfortable, well-fed, safe, while they act naturally and are free from worrying conditions such as pain, fear or stress [Ünal 2005, Strzałkowska *et al*.

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2009]. In appropriate farming operations animals should be protected from diseases and provided treatment when necessary. They should be kept in proper barns, given good management and humane handling and they should be fed a balanced diet on a regular basis [OIE 2008]. Providing the "five basic freedoms" for animals has been defined as avoiding hunger or thirst, fear or stress, physical discomfort or pain, injury or disease, and enabling normal species-related behaviour of the animals [Broom 1991].

In appropriate and economical livestock breeding with optimal breeding conditions the environment, in which the animals are reared should be controlled while considering their physiological and ethological needs based on scientific knowledge and experience concerning the species, developmental stage, adaptation and the domestication situation of the animal [O.G. 2014].

The European Union (EU) policies consider animal welfare in terms of assurance of optimal husbandry conditions and common market organisations [Köseman 2006, Köseman 2008]. In Turkey "Legislation on General Terms Related to the Welfare of Farm Animals" was passed [O.G. 2014].

In a farm providing proper husbandry conditions barns should be built using safe construction materials, the equipment used in barns should satisfy the biological needs of the specific animal breeds and the animals should have easy access to food and water. Furthermore, the buildings should be properly ventilated and lit, while isolation, heating and ventilation of the buildings should be established to ensure air flow, particulate matter levels, heat, relative humidity and harmful gas concentrations within admissible limits to avoid any harm to the animals [Antalyalı 2007].

It has been reported that open-type barns that enable free movement of animals are most suitable in terms of welfare and health of animals. Additionally, the systems providing freedom of movement reduce the risk of foot and udder diseases, while care and management activities are effective in maintaining health and welfare of animals [Regula *et al*. 2004].

Animals manifesting signs of pain or discomfort are described according to the following parameters in 4 groups; Good feeding: absence of prolonged hunger (body condition score), absence of prolonged thirst (water provision, cleanliness of water points, water flow, maintenance of water points). Good housing: comfort related to resting (time needed to lie down, animals colliding with housing equipment during lying down, animals lying partly or completely outside the lying area, cleanliness of the udder, flank, front and hind limbs), thermal comfort (no measure developed), ease of movement (presence of trethering, access to an outdoor enclosure or pasture). Good health: absence of injuries (lameness in animals kept in loose housing systems, lameness in animals kept in tying stalls, integument alterations), absence of disease (coughing, nasal discharge, ocular discharge, hampered respiration, diarrhoea, vulvar discharge, milk somatic cell count, mortality, dystocia, downer cows), absence of pain induced by management procedures (disbudding/dehorning, tail docking). Appropriate behavior: manifestation of social behaviours (agnostic behavior), manifestation of other behaviours (access to pasture), good human-animal relationship (avoidance

distance), positive emotional state (qualitative behaviour assessment) [EFSA 2012].

This study was conducted in the Malatya province of Turkey, where the economy is based on agriculture activities [FDA 2014]. Animal farming in Malatya accounts for approximately 0.90% of cattle in Turkey (14,222,228 animals). In 2016, there were 136,149 bovine animals, including 52,859 dairy cattle. The amount of milk produced was 161,146.16 tons, the number of slaughtered cattle was 19,623 with the yield of meat amounting to 4,134.022 tons [TSI 2017].

Despite the current livestock production potential of that province, no studies have been conducted to determine the standard of animal welfare on cattle farms. The aim of this study was to investigate animal husbandry practices, structural conditions and the influence of husbandry conditions on animal welfare in cattle farms as well as determine the related perceptions of cattle breeders.

Material and methods

This study was performed on 172 farms with about 12 thousand cattle and included interviews with their owners. The farms and owners were selected by a randomised sampling method. By the year 2015 in Malatya there were 2351 cattle farms with more 10 animals [TSI 2017]. These farms number were approximately 23% of total farm numbers in Malatya province. The size of the sample was determined to consider the maximum representation of the population. Voluntary face-to-face interviews were conducted. Additionally, farms were visited in order to evaluate the suitability of their optimal livestock husbandry conditions associated with animal welfare. Table 1 presents the number and structural conditions of farms included in the study, as well as the socio-demographic characteristics of the breeders.

The survey forms were prepared by the Agriculture and Rural Development Supporting Agency (ARDSA) [ARDSA 2015]. The forms were used in the inspection of the farms with regard to husbandry conditions and animal welfare as specified in the Legislation on General Terms Related to the Welfare of Farm Animals, which has yet to be enforced in Turkey [O.G. 2014]. Two pollsters who worked on the study underwent special training on the subject and were asked to perform experimental applications on the farms selected for the current study. The participant owners then had out face-to-face interviews with the pollsters. The breeders had been informed on the content of optimal husbandry conditions before they were asked the questions of the survey. During the survey the farms were evaluated in more comprehensive observations and animals were generally examined. The suitability of the farms to provide optimal husbandry conditions was verified.

The farms were evaluated through observations and the perceptions of breeders. The evaluation assessed the physical characteristics of barns, total area allocated to each animal, the number of animals per area, necessary materials and equipment, the presence of quarantine facilities, harmful materials or equipment, sharp edges or protrusions and the suitability of water sources, ventilation, lighting and stocking density.

Table 1. Structural status of farms participating in the survey and socio-demographic characteristics of farm owners

Age classes of farm owners	Number	Percentage (%)
22-30	11	6.4
31-40	47	27.3
41-50	60	34.9
45-60	40	23.3
61 +	14	8.1
Level of education of farm owners		
literate	3	1.7
primary school	46	26.7
middle School	63	36.6
high school	54	31.4
university	6	3.5
Type of farms		
fattening	114	66.3
dairy	5	2.9
combined	53	30.8
Farm size		
1-5 heads	2	1.2
6-20 heads	29	16.9
21-50 heads	55	32.0
51 heads and more	86	50.0
Barn type		
covered barns	81	47.1
covered free barns	8	4.7
Semi-open barns	23	13.4
covered barns/Covered free barns	10	5.8
covered barns/Semi-open barns	27	15.7
covered free barns/Semi-open barns	18	10.5
other	5	2.9
Bedding type used		
sawdust	18	10.6
straw	2	1.2
dry manure	13	7.6
none	137	80.6

The evaluation also assessed record keeping, resting and movement of animals, the presence of dirty animals, ruminating animals, the animals' interest in food and water, scars on the skin of the animals, animals manifesting pain or discomfort, and ability to move without pain or signs of injury [ANONYMOUS 2019].

In this study, the animals manifesting pain or discomfort were evaluated according to the EFSA a*nimal-based* welfare *indicator*s such as good feeding; absence of prolonged hunger, absence of prolonged thirst (water provision, cleanliness of water points, water flow, maintenance of water points), good housing; comfort related to resting, thermal comfort, ease of movement, good health; absence of injuries, absence of pain induced by management procedures, appropriate behavior; expression of social behaviours and expression of other behaviours [EFSA 2012].

The particulate matter levels, temperature, humidity and harmful gas concentrations were evaluated based on the environmental temperature grades, the number and operation of windows and vents, animal breathing problems, eye and ear

inflammations, lachrymation, nasal discharge or coughing, dust suspended in air in the barns and deposited on surfaces, walls, bedding, equipment, and animal wetness on the body surface of the animal or sweating.

In the statistical analysis, the percentage frequency of answers for each question answered in the survey was calculated as follows:

$$\text{Percentage frequency} = \frac{\text{number of recorded observed answers}}{\text{total number of respondents participants}} \times 100$$

Only the frequencies (%) measured for each question answered in the survey were calculated in statistic analysis. The calculations were conducted using the SPSS version 22.0 software package [SPSS 2015].

Results and discussion

The animals manifesting pain or discomfort were described according to the parameters in 4 groups.

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This study revealed that 63.4% of the farms had sufficient information on the care and feeding of animals, 100% routinely checked the animals at least once a day to detect any kinds of problems, 96.5% treated the animals well and 95.9% treated sick or injured animals properly and immediately based on good feeding, good health and appropriate behaviours specified in a*nimal-based* welfare *indicator*s (Tab. 2).

Table 2. Opinions of farm owners on animal handlers working on farms

Item	Number	Percentage (%)
Is animal care provided by a sufficient number of staff with appropriate knowledge?		
yes	109	63.4
no	63	36.6
Are animals monitored at least once a day?		
yes	172	100.0
no	0	0.0
Are animals treated well?		
yes	166	96.5
no	6	3.5
Are appropriate interventions made to sick or injured animals without delay?		
yes	165	95.9
no	7	4.1
Total	172	100.0

The study also revealed that in 93% of the farms sufficient space was provided to meet the needs of the animals and livestock farming. Space for free movement and comfort resting was provided to meet to requirements related with the time needed to lie down, to avoid animals colliding with housing equipment while lying down, animals lying partly or completely outside the lying area, to ensure cleanliness of the udder, flank, front and hind limbs in 72.1% of farms and no sharp edges or protrusions were found in 77.9% farms, respectively. The materials and equipment used within the barns that the animals could touch were harmless in 72.7% of farms according to the EFSA good housing indicators (Tab. 3).

Table 3. Shelter structures on analysed farms

Item	Number	Percentage (%)
Is freedom of movement provided in a way that does not cause pain and injury?		
yes	124	72.1
no	48	27.9
Is there adequate space for the needs of the animals/animal husbandry operations?		
yes	160	93.0
no	12	7.0
Do animals have contact with harmful materials and equipment?		
yes	47	27.3
no	125	72.7
Do barns have sharp edges and protrusions?		
yes	38	22.1
no	134	77.9
Total	172	100.0

See comment in PubMed Commons belowThe particulate matter count, temperature, humidity and gas concentrations were normal in 82.6% of the farms, artificial ventilation systems were present in 12.8%, natural light was provided in 96.5% and artificial lighting was provided when natural light was insufficient in 89% of farms according to good housing *indicator*s (Tab. 4). There were no empirical

Table 4. Temperature, ventilation and lighting in the farms

Item	Number	Percentage (%)
Are ventilation, dust levels, temperature, humidity and gas concentrations normal in barns?		
yes	142	82.6
no	30	17.4
Is there sufficient natural lighting in barns?		
yes	166	96.5
no	6	3.5
Is artificial lighting provided at insufficient natural lighting?		
yes	153	89.0
no	19	11.0
Is there an artificial ventilation system in barns?		
yes	22	12.8
no	150	87.2
Total	172	100.0

Table 5. Health care practices in analysed farms

Item	Number	Percentage (%)
Are animals being treated with empirical applications that are not based on medical knowledge?		
yes	42	24.4
no	130	75.6
Are there interventions in animals that could cause pain or injury?		
yes	51	29.7
no	121	70.3
Do you have materials or substances that may harm animal welfare / health?		
yes	42	24.4
no	130	75.6
Are treatment or mortality records kept?		
yes	64	37.2
no	108	62.8
Is there a separate compartment / quarantine facility for sick or injured animals on the farm?		
yes	88	51.2
no	84	48.8
Total	172	100.0

Table 6. Animal nutrition in analysed farms

Item	Number	Percentage (%)
Are animals fed an adequate ration for their physiological needs?		
yes	134	77.9
no	38	22.1
Are animals fed at intervals appropriate for their physiological needs?		
yes	56	32.6
no	116	67.4
Are animals given sufficient amounts of clean water?		
yes	157	91.3
no	15	8.7
Are animal feeds and water protected from contamination?		
yes	138	80.2
no	34	19.8
Total	172	100.0

applications that are not based on medical knowledge in 75.6% of the farms, or interventions that may cause pain or injury in 70.3%. There was no material or equipment kept that may impair the welfare and health of the animals in 75.6%, no records of treatments or mortality were kept in 62.8% and no separate section or quarantine facility for sick or injured animals was available in 48.8% farms according to the EFSA good health indicators (Tab. 5).

There was sufficient clean water in 91.3% of the farms, sufficient rations adequate to meet the physiological needs of the animals in 77.9%, while intervals between feedings were inappropriate in 67.4% farms.Food, water as well as water sources

were protected from contamination in 80.2% farms according to the EFSA good feeding *indicator*s (Tab. 6).

Experienced and well-informed caretakers are extremely important in animal husbandry. The knowledge and awareness levels of breeders and their sensitivities affect the success and profit of their farms [Köseman and Şeker 2016a]. They also reduce the stress level in animals and improve animal management conditions [Altýnçekiç and Koyuncu 2015, Stewart 2013]. Thus, animals should be managed by a sufficient number of personnel with proper skills, knowledge and professional qualifications [O.G. 2014].

In this study it was determined that nearly 50% of farms had a sufficient number of caretakers with sufficient skills in animal husbandry operations (Tab. 2). This figure indicates an insufficiency in the care and feeding activities. However, there were high rates of providing food and water for the animals, monitoring animals at least once a day for possible disease or death and rapid intervention, as well as good treatment of the animals (Tab. 2). These high rates indicate that the farms provide adequate measures in this respect.

Good housing area is more important than the total farm area. Lying down and resting are necessary both for animal health and welfare and for efficient production [Westin *et al.* 2016]. Thus, a sufficient and proper area should be provided for permanently or regularly tied animals in order to meet their physiological and behavioural requirements [O.G., 2014]. In a previous study, inadequate animal welfare was found in 94.44% of family farms using a tying system and in 63.64% of improved farms with a tying system [Koçak *et al*. 2015]. However, the percentage of farms with proper areas for animal freedom of movement (72.1%) and adequate space for the needs of animal handling operations (93.0%) were different n our study (Tab. 3). In the province of Şanlıurfa, which is close to Malatya, the space provided for cattle was observed to be sufficient as well [Yener et al. 2013]. Additionally, another study was conducted to define the suitability of cattle farms in Malatya in terms of biosafety conditions and found that only 9.9% of the farms had proper measures and facilities [Köseman and Şeker 2016b].

This study demonstrates that freedom of movement was provided for the animals to avoid any pain or injury, the barns had no sharp edges or protrusions (77.9%) and that the accessible material and equipment would not harm the animals (727%) in most of the farms. However, insufficient and improper conditions were still present in some farms (Tab. 3). These improper conditions should be improved and thus farm owners and caretakers need to be trained in this respect.

See comment in PubMed Commons belowExcessively hot or cold barns, those with air flow, high humidity, excessive levels of particulate matter or harmful gases such as CO_2 or ammonia affect animal health and welfare and resulted in deterioration of their comfort. Thus, appropriate conditions should be provided in a non-harmful manner [O.G. 2014]. Proper temperature and humidity levels in cattle farms and outlet for harmful gases and particles are provided by windows of adequate size and vents

[Ünal 2005]. In addition to natural ventilation, electrical ventilators may also be used. In this study such windows and vents were found in a large percentage of farms, but very few farms had artificial ventilation systems (Tab. 4).

Despite the high frequency of natural ventilation systems the insufficiency cannot be underestimated. Observational evaluations revealed inadequate ventilation, excessive particulate matter levels, temperature, humidity and gas concentrations in some farms. In order to eliminate this, the level of awareness should be raised among breeders, while official control measures and inspections should be established. The low frequency of artificial ventilation may be evaluated positively when environmental conditions are considered.

Natural lighting with proper time and intensity, which is one of the main conditions to be provided in animal farming, was observed at a high frequency, as was the use of artificial lighting in the presence of insufficient natural light (Tab. 4). A previous study observed the presence and severity of various lesions or dampness on the bodies of animals, which were related to insufficient light in the farms, in addition to other factors [de Vries *et al.* 2015]. Therefore, the sufficient natural lighting provided in farms in Malatya and the presence of artificial lighting are a positive finding.

This study revealed higher rates of non-medical interventions (75.6%) and an absence of interventions that may lead to pain or injury (70.3%) than that declared by the owners (Tab. 5). However, the actual frequency detected is important and notable. In a study high rates of dehorning applying hot iron and castration of males without pain relief were reported [Hötzel *et al.* 2014]. However, pain and discomfort led to behavioral changes in the calves [Hokkanen *et al.* 2015]. For these reasons in farms where non-medical interventions and interventions that may lead to pain or injury are performed on animals, training programs for the workers should be planned, farms should frequently be inspected and legal measures should be enforced for the farms with improper applications.

No materials or equipment that may impair animal management conditions or health were kept in most of the farms (Tab. 5). However, some farms were negative exceptions in this respect. In order to eliminate the farms with such incorrect applications, attention should be paid to training and conscientious husbandry programs. Generally records of treatments performed on the animals or mortality were rarely kept in Malatya (Tab. 5). This was similar to the findings in another study, where no records of calf diseases or mortality were kept [Hokkanen *et al.* 2015]. The records are believed to be unnecessary by most breeders. Thus, records should be requested from the owners at inspections and control visits, and respective recommendations should be made [O.G. 2014]. The importance of disease and mortality records need to be explained to all breeders and caretakers through training programmes.

The percentage of farms with separate sections or quarantine facilities for sick or injured animals was moderate (51.2%) (Tab. 5). Sick animals should be isolated from others to maintain their health and to provide adequate rest for the sick ones. Therefore, separate compartments that are distant from the barns should be present.

Such places should be required when the Malatya Directorate of Provincial Food Agriculture and Livestock gives licenses to the farms, and those which are previously licensed should be instructed to build such places.

The percentage of farms that give clean water to animals was very high in Malatya. There was also a high percentage of farms that feed the animals with rations according to their physiological requirements and protect their water, food and water sources from contamination. However, the percentage of farms that fed the animals at proper intervals was low (Tab. 6). Not suffering from thirst or hunger is one of the five basic freedoms of animals [Broom 1991]. Therefore, food that meets the physiological requirements of the animals should be given in sufficient amounts and at proper intervals. Furthermore, animals should have access to a sufficient amount of water every day [O.G. 2014], while in hot climates additional water should be provided [Mader and Griffin 2015]. In addition, the food and water given to the animals should be clean and the food should be free of mould or rotten components. Considering the rates observed in this study (primarily for feeding the animals at regular intervals), owners and caretakers should be trained on animal feeding to eliminate the impediments in these farms, while sanctions should be imposed on those who refuse to conform to the requirements.

Conclusion

The farms generally did not sufficiently conform to optimal husbandry conditions in terms of animal welfare. The animal management conditions in the farms should be improved by training their personnel and implementing effective animal welfare legislations.

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