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Overview of Animal Welfare Aspects of Bali Cattle with Confined Typology in Sumbawa Regency, NTB, Indonesia

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Abstract

The quality of life of cattle will affect their productivity, where productivity is an indicator of animal welfare. Sumbawa is one of the national cattle source areas in Indonesia, both as a producer of beef cattle and seed cattle. The research has been carried out using a survey method, collecting data through structured interviews using questionnaires, field observations and the Animal Needs Index (ANI) with 40 respondents. The purpose of the study was to determine the level of welfare of Bali cattle with the Confined typology in Sumbawa Regency. The results showed that the total ANI score in the study area was 15.32, which was included in the almost prosperous category. The recommendation is that it is necessary to improve the aspect of being freedom from discomfort (FDC) and the aspect of being freedom to express natural behavior (FENB) to improve animal welfare through increasing awareness and understanding of farmers and there needs to be government policy intervention in the context of implementing animal welfare in Sumbawa Regency as a efforts to increase the productivity of Bali cattle.

Keywords: animal welfare, ANI, Bali cattle, confined, productivity

1. Introduction

The definition of animal welfare in the Law of the Republic of Indonesia number 41 of 2014 concerning amendments to Law No. 18 of 2009 concerning Animal Husbandry and Animal Health clause 1 Section 42 is all matters relating to the physical and mental state of animals according to behavioral measures. Natural animal nature needs to be implemented and enforced to protect animals from any person's inappropriate treatment of animals that are used by humans. Animal welfare targets are all animals that interact with humans where human intervention greatly affects the survival of both animals in confinement, livestock and slaughter animals, working animals and pets [1]. The quality of life of animals will affect their productivity, where productivity is an indicator of animal welfare. The application of animal welfare aspects in the livestock industry is recognized as having the potential to increase animal productivity and improve meat quality [2].

Parameters for evaluating animal welfare that have been internationally recognized by classifying are The Five Freedoms [3] as follows: 1. Freedom from hunger and thirst; 2. Freedom from discomfort; 3. Freedom from pain, injury and disease; 4. Freedom to express natural behavior; 5. Freedom from fear and distress. Although aspects of animal welfare are grouped into two of five freedoms, the first four freedoms are to relieve suffering and the second freedom is to express normal behavior [4]. The application of animal welfare in cattle farming can mean placing cows in adequate facilities, protection from pain and protection from environmental extremes, such as air temperatures that are too hot or too cold [5].

Sumbawa Regency, Nusa Tenggara Barat (NTB) is one of the national cattle source areas in eastern Indonesia, both as a producer of beef cattle and seed cattle. Bali cattle population growth in Sumbawa is very dynamic starting at 0.34% in 2017; 4.69% in 2018; 1.36% in 2019; 1.33% in 2020 and − 3.78% in 2021. Meanwhile, growth other than Bali cattle such as Sumbawa cattle and crossbreed cattle was 1.47% in 2017; 19.54% in 2018; 81.14% in 2019; 70.33% in 2020 and −3.78% in 2021 [6].

The Bali cattle production system in Sumbawa, the results of the 2017 research, contained 34 typologies seen from the annual maintenance cycle. All of the typologies mentioned above have three typologies that are the most dominant, namely typology 6/6; tethered typology; and confined typology [7]. Currently, the typology that is increasingly being applied by farmers is the confined typology, the advantages of the confined typology are because there is a cattle insurance program, the ease of accessing people's business credit (PBC) for cattle business development from state-owned banks, while the 6/6 typology and tethered typology stagnant and even tends to decrease due to the change in land function and the existence of regional regulations that prohibit the free release of livestock. Therefore, the quality of life of Bali cattle with confined typology as seen from the knowledge and understanding of farmers in raising livestock which is part of animal welfare has never been reported. Based on the above phenomenon, an animal welfare level study with confined typology has been carried out in Sumbawa Regency.

2. Animal welfare view in Indonesia

In Indonesia, issues of animal welfare and human rights were raised by the Indonesian Veterinary Association and animal rights activists in the 2000s. Various campaigns were launched, including improving the methods of slaughtering animals, sacrificial animals, to comply with animal welfare principles. The campaign was carried out on inter-island cattle transportation that often tortures animals, such as hanging cattle from one leg or throwing cattle from a truck [8].

The lack of information and regulations on animal welfare in cattle farming practices has an impact on the lack of animal welfare practices in the field [9]. Various studies have been conducted that focus on animal welfare, such as in several farms in the Pangkal Pinang area, Bangka Belitung Islands Province using the ANI method with five categories of animal welfare, namely movement, social contact, floor quality, light and air and cage cleanliness. The study shows that beef cattle are generally in a prosperous condition with a total ANI score of 23.8 [10]. The same thing was done by Sulistiawati and Wulandari [5] in the Nganjuk area, East Java Province with the results of the study showing that animal husbandry quite meets animal welfare standards (ANI category score 23) and almost does not meet animal welfare standards (ANI category score 12.8), meets animal welfare value standards if the total score is ANI category 32.

Animal welfare research on cattle slaughtered at the Banda Aceh Municipal Slaughterhouse (RPH). The animal welfare parameters observed included three aspects, namely transportation, shelter and slaughter. The three aspects are compared with the recommendations of Meat Livestock Australia (MLA) and the Indonesian National Standard 02–4509-1998. The method used is scoring assessment. Based on the scoring assessment of the shelter aspect and the slaughter aspect, the animal welfare of the slaughtered cattle at the Banda Aceh Municipal RPH is considered good in fulfilling the animal welfare aspect, while the transportation aspect is considered sufficient in meeting the animal welfare of the cattle slaughtered at the Slaughterhouse [11]. The development of the implementation of social welfare policies in the form of proposals through academic reviews as a basis for implementation. The concept of an animal welfare assessment system for sustainable cattle production in Indonesia which is based on protocols, human resources and the government. These three main elements in the animal welfare assessment system will be integrated to build sustainable cattle production through better animal welfare practices [9].

3. Welfare measurement techniques for Bali cattle in Sumbawa

The research was conducted in July–October 2021 with four regions, namely west, east, north and south with 40 respondents. The respondent's criteria are Bali cattle farmers with a confined typology production system that has a cage with a minimum population of 10 Bali cattle with at least 3 years of livestock experience. Primary data were collected through direct interviews and secondary data from government agencies as well as direct observation for measurement (cage, feed, livestock behavior) and documentation. Data analysis used the Animal Needs Index method [12]. The determination of the rating scale was done using a Likert scale of 1–5 (**Table 1**).

4. Aspects of animal welfare for Bali cattle in confined typology

In confined typology, there are limitations for livestock in accessing feed ingredients because everything is regulated. The role of livestock rearing management is of particular concern to livestock because it will support an increase in productivity through the application of animal welfare. Good management occurs when public awareness and knowledge are at a high level so that livestock can be guaranteed in terms of access to feed ingredients, drinking, comfort, health and normal behavior.

Categori	Total Score	Range Score
Very prosperous	25	21–25
Prosperous	20	16–20
Almost prosperous	15	11–15
Not prosperous	10	6–10
Very not prosperous	5	0–5

Source: primary data, processed 2021.

Table 1.
Classification of cattle welfare level.

4.1 Knowledge and understanding of farmers

The understanding and knowledge of farmers on livestock welfare or animal welfare need to be known as a supporting aspect in the context of deepening the aspects that are the determining variables. There is a positive relationship between humans and animals, especially the adequate knowledge and skills possessed by farmers [13].

Table 2 shows the knowledge and understanding of farmers (KU1) about animal welfare with an average value of 1.64 (do not know category). This is due to the factor of not getting information about livestock welfare received by farmers independently and through socialization or technical guidance. Handling and productivity of livestock can be increased through training programs aimed at improving the attitudes and behavior of farmers toward their livestock [14, 15]. Specific training and skills can be beneficial [16].

This condition will certainly affect the farmers' understanding of animal welfare itself. The results of the study, in **Table 2**, show that only 1.56 breeders' have a lack of understanding of the KU2 value about animal welfare. Knowledge and understanding of farmers who do not know and understand as a result of the lack of socialization or information received by farmers is KU3 = 1.41 about animal welfare. The results of the research on the level of knowledge and understanding as well as getting information about animal welfare or cattle welfare in the Sumbawa district with a score of 1.54 is in a low category.

Animal welfare status is not always constant due to fluctuations in the factors responsible for good or bad welfare. Therefore, animal welfare status can be good, bad or somewhere in between [17] and varies with time. In general, if the cattle are healthy, comfortable, well nourished, free from pain, fear and distress and able to express their innate behavior, their welfare will be fulfilled [3]. The fulfillment of animal welfare is obtained from good husbandry, including the prevention and treatment of disease, humane handling and slaughter, and the provision of adequate nutrition and shelter [18].

4.2 Freedom from hunger and thirst

The American Society for the Prevention of Cruelty Animals [19] states that the level of animal welfare is said to be good if the livestock is free from hunger and

Region	Knowledge and understanding			Total	Average
	KU1	KU2	KU3		
East	2.20	2.10	2.10	6.40	2.13
West	1.38	1.13	1.13	3.63	1.21
North	1.30	1.40	1.00	3.70	1.23
South	1.70	1.60	1.40	4.70	1.57
Total	6.58	6.23	5.63	18.43	6.14
Average	1.64	1.56	1.41	4.61	1.54

Source: Primary data, processed 2021.
KU1 = know, KU2 = understand, KU3 = get information.

Table 2.
Knowledge and understanding of farmers about animal welfare.

Region	Indicator freedom from Hunger and Thirst							Total	Average
	FHT1	FHT2	FHT3	FHT4	FHT5	FHT6	FHT7		
East	3.40	3.70	3.10	2.80	3.40	3.40	2.50	22.30	3.19
West	2.88	2.88	2.63	3.13	3.63	3.00	3.00	21.13	3.02
North	2.70	3.30	2.50	3.10	3.40	3.20	3.10	21.30	3.04
South	2.70	3.60	2.50	3.10	3.20	3.50	3.40	22.00	3.14
Total	11.68	13.48	10.73	12.13	13.63	13.10	12.00	86.73	12.39
Average	2.92	3.37	2.68	3.03	3.41	3.28	3.00	21.68	3.10

Source: Primary data, processed 2021.
FHT1 = provide/feed as needed; FHT2 = provide/give water as needed; FHT3 = type of feed given; FHT4 = amount of feed given; FHT5 = how to feed; FHT6 = signs of cattle not feeling hungry and thirsty; and FHT7 = loss when cattle feel hungry and thirsty.

Table 3.
Freedom from hunger and thirst.

thirst. The aspect of consumption is a concern in animal welfare, this is indicated by the fulfillment of feed and water consumption so that livestock no longer feel hungry and thirsty. Livestock must have access to adequate feed and water according to their age and needs to maintain normal health and productivity and prevent hunger and thirst, malnutrition or prolonged dehydration [13]. The aspect of being free of hunger and thirst is the main measuring tool in assessing the level of animal welfare.

Table 3 shows that the supply of feed according to needs with a value (FHT1 = 2,92) is still in the fairly good category, which means that the understanding and awareness of farmers in the context of providing feed that is in accordance with needs, has an impact on feed management. In an intensive cattle production system, all cattle are locked up and all rely on farmers for basic needs, such as cages, feed and drinking water [4]. Adequate water supply with a value of FHT2 = 2.68 shows awareness and understanding of the importance of water consumption for livestock and water as a basic need looks quite good. This is indicated by the provision of water ad libitum to livestock, there are also others who provide drinking water to cattle an average of two times a day in the morning and evening.

The provision of water in a confined typology should be ad libitum as the role of water in the body is very important because the largest nutrient in the body composition of livestock is water. The need and consumption of water depend on several factors, such as temperature, humidity, water temperature, production level, pregnancy status, physical activity, growth rate, animal size, type of food, water content of feed, salt content consumed and dry matter consumption [20, 21]. Consideration of good water quality is also given to reduce the incidence of disease and economic losses [22]. Understanding issues of water quality and consumption is critical to cattle nutrition and management [23].

The type of feeding that is suitable for cattle with an average value of FHT3 = 2.68 indicates that the type is quite varied depending on the season. In the rainy season, farmers rely on forage in the form of various types of natural grass, including types of legumes such as wild or cultivated *leucaena*. The limited number of farmers who cultivate superior grasses such as elephant grass, king grass, mott elephant grass and legume cultivation (*leucaena, indigofera, sesbandia glandiflora*) is a limiting factor in providing the varied feed. There is an additional type of feed in the form of concentrate (*rice bran, zea mays*) although still a small number of farmers apply this.

However, in the dry season, farmers rely on the remaining agricultural products in the form of rice straw, corn straw, corn cobs, corn husks, zea mays, green bean straw and *leucaena,* which still survive in the dry season. The amount of appropriate feed for cattle is quite good with an average value of FHT4 = 3.03, meaning that farmers have sufficient ability to understand the feed needs of cattle.

Forage quality affects dry matter consumption, so increasing forage quality will be followed by an increase in total digestible nutrients (TDN). The existence of the ability of farmers to assess signs of the adequacy of feed by looking at signs of cattle feeling full, cattle not wanting to eat anymore, and based on the experience of raising livestock for generations. In addition, the understanding of farmers through socialization or technical training on the adequacy of animal feed contributes to a fairly good FHT4 value. The way of feeding the category is quite good with an average value of FHT5 = 3.41 indicating that the awareness of farmers about regularity in the feeding pattern has been carried out quite well. Regular feeding with an average frequency of feeding 2–3 times a day, namely in the morning, afternoon and evening, has become a habit and culture for raising livestock for the Sumbawa people. So that the certainty of cattle feeling full is a target in feeding management, this can be seen from the value of the ability of farmers to recognize signs of livestock feeling hungry and thirsty quite well with an average value of FHT6 = 3.28 with a fairly good category. Understanding of hunger and thirst such as the left side of the cattle's stomach is flat, the cattle will be aggressive when there are people in the cages, the cattle are restless, make noises, do not want to stay still, and always scavenge or lick the feed. The ability to understand the signs of livestock feeling hungry and thirsty is an advantage possessed by farmers in the Sumbawa Regency as a real form of the evaluation process in feeding management. The awareness of farmers about the importance of livestock free from hunger and thirst can be proven by looking at the ability of farmers to assess the impact or loss it causes.

Understanding the mechanism of regulation of consumption/intake and regulation of energy balance in ruminants is very important to increase the production efficiency [24]. Changes in behavior are caused by variations in hunger [25]. The average value of losses when cattle feel hungry and thirsty (FHT7 = 3.00) is quite good, meaning that farmers can assess and ascertain what consequences will occur. Various losses that will be caused in the form of livestock will experience weight loss and are susceptible to disease so that they experience losses in their business, besides that, it takes a long time to maintain a reduction in the cost of treatment and care for disease as well as a reduction in mortality rates and improvements in health will reduce economic losses [2]. Based on the assessment aspects above, in general, the management of feeding and drinking in the Sumbawa district with an average value of 3.10 is still in a fairly good category in terms of being free of hunger and thirst. The feeding schedule for captive cattle is determined by the farmer and the feeding schedule four times a day is categorized as very good [19].

4.3 Freedom from discomfort

The aspect of being free from discomfort in **Table 4** shows that the knowledge of farmers about signs of cattle feeling comfortable in cages can be seen from the average value of FDC1 = 3.16 with a fairly good category. Some signs of cattle feeling comfortable in the cage based on the understanding of the farmer such as cattle are not restless, normal breathing is not gasping for breath, cattle are not rebellious, cattle tend to be silent, do not rebel, want to get out and are calm in the cage by sleeping

Region	Freedom from discomfort									Total	Average
	FDC1	FDC2	FDC3	FDC4	FDC5	FDC6	FDC7	FDC8	FDC9		
East	3.40	3.20	2.80	2.80	2.30	2.90	3.00	2.80	3.80	27.00	3.00
West	3.13	3.00	2.88	3.13	1.00	1.13	3.13	1.00	3.00	21.38	2.38
North	2.90	3.10	3.40	3.10	1.60	1.30	3.10	1.00	3.80	23.30	2.59
South	3.20	3.40	3.10	3.10	2.40	2.20	2.90	1.00	3.20	24.50	2.72
Total	12.63	12.70	12.18	12.13	7.30	7.53	12.13	5.80	13.80	96.18	10.69
Average	3.16	3.18	3.04	3.03	1.83	1.88	3.03	1.45	3.45	24.04	2.67

Source: Primary data, processed 2021.
FDC1 = sign of cattle feeling comfortable in the pen; FDC2 = sign of cattle not feeling comfortable; FDC3 = cage position is suitable for comfort; FDC4 = size/capacity/capacity of the cage; FDC5 = information on how to make a good cage; FDC6 = received information/counseling on cage sanitation; FDC7 = adequate and comfortable cages equipment; FDC8 = cages ventilation; and FDC9 = in the morning sunlight.

Table 4.
Freedom from heat and feel comfortable.

comfortably in the cage. Ways to get the comfort of livestock, it is necessary to protect them from extreme areas, such as heat, rain, and wind [26] as well as the management of housing by farmers, as one of the fulfillment of the basic needs of livestock other than food and water [4]. Farmers have quite good knowledge about the signs of livestock feeling uncomfortable in the cage, this can be seen from the average value of FDC2 = 3.18 with a fairly good category. The standard of livestock comfort is obtained by making the construction of the floor of the cage that is not wet and slippery and easy to clean [26].

A good position and location of the cage is the most important thing that affects the comfort of livestock in the cage. Farmers must prepare a shady place and comfortable rest for their livestock [4]. The knowledge of farmers that the direction of the cage must receive morning sunlight so that the direction of the cage is mostly facing east. This can be seen from the mean value of FDC3 = 3.04 included in the good enough category, meaning that farmers have good knowledge and understanding of building cages. The comfort of livestock in cages can also be influenced by the density of livestock in cages, this can be seen from the mean value of FDC4 = 3.03 with a fairly good category. Knowledge and understanding of farmers about power the livestock capacity is quite good, it can be seen that the planning for the construction of the cage is adjusted to the number of cattle to be kept. The current average livestock capacity is 3 m^2/head. The standard housing [12] equipped with booths is 2.2 m^2/head cattle for beef cattle weighing 350 kg.

There is limited information on how to make suitable cattle cages, the standard for making good cages is that the floor is not slippery and easy to clean [26] and the placement of the cage in a shady position [4] must be considered and should not be ignored. This can be seen from the average value of FDC5 = 1.83 in the less category. Lack of information about building good cages and meeting the requirements for livestock comfort is still not good in the form of socialization and counseling only relying on experience and knowledge passed down from parents. Understanding of cages for livestock cattle is to limit the movement space so that the accumulation of meat and fat occurs quickly and the weight gain of livestock is faster [27].

The cleanliness of the cage is also important to maintain the comfort of the livestock, therefore, the floor of the cage must be easy to clean [26]. Farmers'

knowledge of good sanitation methods is still lacking, this can be seen from the value of FDC6 = 1.88 in the poor category. This is due to the lack of socialization and counseling because many farmers ignore good cage sanitation methods only relying on experience. In addition, the provision of supporting equipment also needs to pay attention to the comfort of livestock, meaning that farmers have sufficient knowledge of the provision of cage equipment that meets the requirements for use in cages and does not endanger livestock. It is the farmer who can choose and plan whatever the livestock needs [28]. This can be seen from the FDC 7 = 3.03 in the fairly good category. By relying on experience and simple manual equipment the provision of equipment used in cages but not harmful to livestock.

Farmers' understanding of ventilation is not needed, this can be seen from the average value of FDC8 = 1.45 in the category not needed because an open cage system can guarantee air circulation in the cage, so it does not require special ventilation. Optimal air quality is obtained from open cages [12]. Open cages provide a minimum of 0.45 m^2/AWU with unrestricted access to open air, with a minimum opening height of 1 m [12]. Knowledge and understanding of farmers about a good position of the cage building can enter the morning sun as seen from the average value of BTN9 = 3.45 with a poor category. The importance of the morning sun entering the cage is mandatory in order to maintain the health of livestock. Based on the above components, the aspect is free from heat and feeling the comfort of livestock is quite good, this can be seen from the average value of FDC = 2.67 with a fairly comfortable category. The shape of the cage is quite open and has good air circulation in the cage so that it makes the cattle comfortable and enough sunlight illuminates the cage [10]. This condition [29] makes the place to lie down is always dry. Sunlight hitting the eyes of animals should be used in research with consideration, the percentage of direct sunlight that enters through the windows is affected by the projection of roofs, trees, buildings blocking the sky [12].

4.4 Freedom from pain, injury and disease

Table 5 shows that the cattle have experienced illness/injury with an FPID1 = 3.73 category of never. There were incidents of livestock getting injured or injured as a result of the transportation process, when they came out of the cage, they were scratched by the fence while the cattle got sick during the rainy/transient season in the form of scabies, bali zekte, pink eye and intestinal worms. The appearance of illness both physically and physiologically can be caused by stress in animals [30]. Therefore, it is important to raise or tame cattle with gentleness and respect without violence and pain. This is important because in Indonesia, farmers must prepare livestock in a safe, healthy, disease-free, intact condition without defects and halal (good) to be consumed [31]. Therefore, it is also important for farmers (producers) to choose livestock with better disease resistance early in life [32].

The actions taken by most farmers by consulting with livestock health officers have been carried out, this can be seen from the FPID2 = 3.31 value in the category of having done. This is done as a form of farmer awareness to protect and maintain the health of livestock from disease, following the statement that says that farmers must be able to prevent, diagnose and treat livestock if they are exposed to disease [4]. Cattle health needs to be considered when raising cattle, because to get good quality meat, cattle must be healthy [10]. The success of a cattle farming business is largely determined by the health of the livestock itself [33].

Protection and treatment measures are due to the lack of knowledge and skills of farmers in terms of treatment and livestock health, but other efforts are made with

Region	Freedom from pain, injury and disease										Total	Average
	FPID1	FPID2	FPID3	FPID4	FPID5	FPID6	FPID7	FPID8	FPID9	FPID10		
East	4.00	2.90	4.60	4.60	4.70	3.50	2.40	4.10	3.10	4.20	38.10	3.81
West	3.50	3.25	4.63	4.63	5.00	3.75	3.38	2.25	2.75	4.00	37.13	3.71
North	3.70	3.50	4.50	4.30	5.00	3.30	2.60	3.40	2.70	4.00	37.00	3.70
South	3.70	3.60	4.70	4.60	5.00	4.30	3.70	2.70	2.10	4.10	38.50	3.85
Total	14.90	13.25	18.43	18.13	19.70	14.85	12.08	12.45	10.65	16.30	150.73	15.07
Average	3.73	3.31	4.61	4.53	4.93	3.71	3.02	3.11	2.66	4.08	37.68	3.77

Source: Primary data, processed 2021.

FPID1 = ever been injured/sick; FPID2 = consultation with health workers; FPID3 = injured/fallen in cage; FPID4 = fight/horn each other; FPID5 = injury/illness due to equipment; FPID6 = giving a burn stamp; FPID7 = separation of calf, cow and bull; FPID8 = separation of sick cattle; FPID9 = satisfied with the current condition of the cage; and FPID10 = needs adjustment.

Table 5.
Freedom from pain, injury and disease.

local knowledge using ingredients that are passed down from generation to generation. Other factors that have the opportunity to cause livestock to be injured/injured/fallen sometimes occur, this can be seen from the mean value of FPID3 = 4.61 for the occasional category. The high FPID3 value was also caused by the condition of the cage floor which was less inclined and fell when the floor was wet and slippery. The floor is very important to provide a good grip to prevent cattle from slipping or falling [12]. In addition, poorly managed floors can cause injury to livestock hooves [12]. Lameness due to injury or disease of the legs is considered a major problem in cattle [34]. Another factor is cattle that are shocked or when the cattle are new and not yet tame when they enter the cage.

The incidence of cattle horning each other has never happened and suffered injuries, this can be seen with the value of FPID4 = 4.53 in the never category. This means that the chances of each other having a low-frequency horn occur because there is a barrier between livestock. The possibility of injury to livestock can also occur due to unsafe equipment during cage sanitation. The understanding and skills of farmers play a very important role, this can be seen with a FPID5 = 4.93 with the category of never occurring because the equipment used is not made of hazardous materials, such as iron or sharp tools, on average, farmers use materials in the form of wood, plastic or rubber so that the possibility of injury to livestock can be avoided.

The awareness of farmers in the maintenance and care of cattle is very good. This can be seen by avoiding things that can cause injury or illness to cattle in line with the opinion [35] that livestock should not be intentionally hurt, by no longer giving a sign in the form of a burn stamp to avoid livestock experience stress due to adverse activities/management. This can be seen by the average value of FPID6 = 3.71 for the occasional category. This condition occurs because the marking in the form of a burnt stamp is a sign given by the previous owner. In addition, marking is no longer necessary because livestock no longer mixes with other people's livestock. Another reason for farmers is the demand for consumers who prefer livestock without markings, such as qurban cattle and the reason for the economic value that livestock that do not have defects such as burn marks are higher. In efforts to prevent livestock from getting injured due to physical contact in the form of horns, it is necessary to separate the bull from the cow or the calf. This can be seen by the average value of FPID7 = 3.02 category ever.

Knowledge and understanding as well as experience of farmers are good to avoid physical contact that causes livestock to suffer injuries in the cage. In addition, the separation of male, mother and child cattle is also aimed at controlling the disease. This can be seen by the average value of FPID8 = 3.11 in the never category, meaning that when there is an incident of livestock experiencing illness, it must be separated from the group to facilitate handling and treatment. In addition, to avoid the occurrence of disease transmission that can harm the economy. The limitations of farmers with cage management are still limited, this can be seen by the value of FPID9 = 2.66, the category is quite satisfied. This is due to the limited manual and traditional cage equipment and the limited form and construction due to limited cage financing. Limited space and livestock unable to show some of their natural behaviors can lead to disease risk and high feed competition [4]. The existence of additional information through social media as well as an understanding of appropriate and good cage management creates a desire to improve the quality of the cage facilities, this can be seen from the average value of FPID10 = 4.08 categories. It is necessary to adjust and improve the quality of the cage facilities in order to improve

the quality of management maintenance. Based on the overall component aspects of the assessment of being free from illness, injury and disease with a FPID value of 3.77 good category.

4.5 Freedom to express natural behavior

Opportunities for animals to move need to be assessed and express their natural behavior according to their behavioral needs [12]. Animal welfare is best demonstrated by the presence of several natural animal behaviors observed [4]. Freedom to express natural behavior is obtained by providing sufficient space, appropriate facilities and friends of the animal species itself for social interaction [4]. In addition, it is important to facilitate livestock so that they can behave normally when getting up, standing and lying down [12]. Livestock management techniques are important to use the natural behavior of the cattle themselves [35]. Currently, livestock behavior assessment can be assessed scientifically to determine the quality of life of individual animals [28]. Based on **Table 6**, the time the cattle were released outside the cage can be seen from the mean value of FENB1 = 2.69 in the category of never/no time. Farmers really need to prepare an outdoor area of about 3–5 m²/AWU [12].

The knowledge of farmers about the importance of livestock being released at any time to express natural behavior, has been carried out by providing time for this. The frequency and duration of livestock access outside the room are important factors, with an average duration of more than or equal to 2 hours [12]. In addition to the availability of time to do body exercises and express natural behavior, the duration of time on a regular basis is important, this can be seen from the average FENB2 = 2.96 categories once a week. The duration of 1 full day once a week or equivalent to 51 days a year has been carried out by farmers regularly. The exercise pattern carried out by farmers is by walking the cattle outside the cage. This can be seen by the average value of FENB3 = 3.11 in the category of being invited for walks outside the cage for fattening efforts. The importance of livestock expressing natural behavior can be seen from the average value of FENB4 = 3.74 in the necessary category. Expressing normal behavior so that livestock can move freely, muscles are not stiff so that livestock do

Region	Freedom to express natural behavior				Total	Average
	FENB1	FENB2	FENB3	FENB4		
East	3.30	3.50	3.90	3.90	14.60	3.65
West	2.38	2.63	2.13	3.25	10.38	2.59
North	2.50	3.10	3.20	4.00	12.80	3.20
South	2.60	2.60	3.20	3.80	12.20	3.05
Total	10.78	11.83	12.43	14.95	49.98	12.49
Average	2.69	2.96	3.11	3.74	12.49	3.12

Source: Primary data, processed 2021.
FENB1 = free time; FENB2 = length of free time; FENB3 = maintenance model to freely express normal behavior; and FENB4 = need cattle to express natural/normal behavior.

Table 6.
Freedom to express natural behavior.

not cramp and suffer muscle injuries. The good health of livestock is influenced by the natural behavior of the animal [36]. Based on all components of the free aspect of expressing natural behavior with an average value of FENB = 3.12, the category is quite good.

4.6 Freedom from fear and stress

Farmers must be able to fulfill their responsibility to provide a well-managed cage environment to prevent stress on animals, including noise which can also cause stress [12]. The behavior of cattle to stress can reduce the productivity and health of livestock [37]. High levels of stress can reduce the response of the immune system and increase the incidence of infectious diseases [36]. **Table 7** shows the average value of FFS1 = 4.49, the category of cattle sometimes experiencing fear and stress from wild animal disturbances. There is protection in the form of care or control, that is always carried out by farmers. The position of the cage that is close to the road and far from the forest can reduce the chance of disturbance by wild animals, but there are some cases for farmers in the form of dog disturbance during the parturition of cattle. In addition to wild animals, other social activities can also have an influence in the form of fear and stress on cattle. This can be seen by the average value of FFS2 = 4.52 categories never, this is due to the location of the cages of most of the farmers far from residential areas so that human social activities do not affect the cattle.

Routine security monitoring and control at all times is so intense that the chances of outside interference are minimal. This is in line with the view of [12] that good housing environment management can prevent stress on livestock. This has an impact on the low handling of livestock experiencing stress, this can be seen with the FFS3 = 1.35 category never. The low number of cases experienced by farmers due to disturbance of wild animals or human activities, even if there are, will immediately be handled so that livestock do not experience stress for a long time and do not suffer economic losses. The low effort of farmers to reduce stress on cattle can be seen by the low average value of FFS4 = 1.15 in the never category. The lack of handling efforts due to preventive efforts or prevention by intensively maintaining livestock safety. This is evidenced by the high average value of FFS5 = 4.68 categories that have experienced fear so that cattle experience stress. The absence of protection to reduce

Region	Freedom from fear and stress							Total	Average
	FFS1	FFS2	FFS3	FFS4	FFS5	FFS6	FFS7		
East	4.30	4.40	2.20	1.60	4.30	2.10	1.20	20.10	2.87
West	4.75	4.38	1.00	1.00	5.00	1.00	1.38	18.50	2.64
North	4.70	4.70	1.00	1.00	4.70	1.00	1.00	18.10	2.59
South	4.20	4.60	1.20	1.00	4.70	1.00	1.00	17.70	2.53
Total	17.95	18.08	5.40	4.60	18.70	5.10	4.58	74.40	10.63
Average	4.49	4.52	1.35	1.15	4.68	1.28	1.14	18.60	2.66

Source: Primary data, processed 2021.
FFS1 = experienced attack/disruption by wild animals; FFS2 = experiencing stress due to disturbance from wild animals or other activities; FFS3 = experiencing fear to stress; FFS4 = never handle fear; FFS5 = how often do you experience fear; FFS6 = special protection; and FFS7 = stress treatment effort.

Table 7.
Freedom from fear and stress.

Region	Animal Needs Index					Total
	FHT	**FDC**	**FPID**	**FENB**	**FFS**	
East	3.19	3.00	3.81	2.87	3.65	**16.52**
West	3.02	2.38	3.71	2.64	2.59	**14.34**
North	3.04	2.59	3.70	2.59	3.20	**15.12**
South	3.14	2.72	3.85	2.53	3.05	**15.29**
Total	12.39	10.69	15.07	10.63	12.49	**61.27**
Average	3.10	2.67	3.77	2.66	3.12	**15.32**

Source: Primary data, processed 2021.
FHT = Freedom from hunger and thirst; FDC = Freedom from discomfort; FPID = Freedom from pain, injury and disease; FENB = Freedom to express natural behavior; FFS = Freedom from fear and stress.

Table 8.
Assessment of animal welfare level.

the fear of livestock to prevent stress can be seen by the low value of FFS6 = 1.28 in the none category. The absence of cases experienced by farmers caused no treatment carried out by farmers, this was seen by the average value of FFS7 = 1.14 in the category of none. Based on all components of the aspect of being free from fear and stress with an average value of FFS = 2.66, the category is quite good.

4.7 Comprehensive review of animal welfare level assessment

Based on the results of **Table 8** analysis for the five aspects of animal welfare in Sumbawa Regency with a total average score of 15.32, is in the almost prosperous category. The lack of welfare of cattle is caused by the level of knowledge and understanding of farmers, who are still lacking as a result of the absence of socialization or information received by farmers about animal welfare, only relying on hereditary experience in the cattle rearing system.

5. Conclusion and recommendation

Based on the results and discussion, it can be concluded that the value of the level of animal welfare or the welfare of Bali cattle with confined typology in Sumbawa Regency with a total ANI score of 15.32 is included in the almost prosperous category. The recommendation is that it is necessary to improve the aspect of being freedom from discomfort (FDC) and the aspect of being the freedom to express natural behavior (FENB) to improve animal welfare through increasing awareness and understanding of farmers and there needs to be government policy intervention in the context of implementing animal welfare in Sumbawa Regency as a efforts to increase the productivity of Bali cattle.

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Conflict of interest

We declare that there is no conflict of interest with financial, personal or other relationships with other parties or organizations related to the material discussed in this chapter.

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