OPEN ACCESS
Advances in Animal and Veterinary Sciences

Research Article

Existing Conditions of LEISA Dairy Cattle Farming in the Lowlands, East Kolaka Regency

Nur Santy Asminaya*, Fuji Astuti Auza, Musram Abadi, Dian Agustina, Andi Murlina Tasse, Panji Adi Satria

Animal Science Department, Faculty of Animal Science, Halu Oleo University, Kendari, South East Sulawesi, Indonesia.

Abstract | This study aims to comprehensively evaluate the process of maintaining dairy cattle using the LEISA pattern in the lowlands of East Kolaka Regency in order to identify strategic steps that can be used for the development of dairy cattle in the region. The research method used is observation. The research variables measured include: availability and potential of odot grass, feed intake and digestibility, BCS, and physiological responses of dairy cattle. The results of the study showed that odot grass on dairy farms was quite abundant, and the number of dairy cattle could be increased to reach 24.62 AU. The DMI, OMI, CP, and TDN values were 2.05, 1.87, 0.38, and 1.49 kg/head/day, respectively. The intake of feed nutrients did not meet dairy cattle's needs. The digestibility values of DM, OM, and CF in this study were 82.73%, 57.73%, and 47.93%, respectively. The BCS value of cattle showed a figure of 2.5 (moderate). The physiological response of livestock shows that dairy cattle are still in a comfortable condition with the environmental temperature. This study concludes that dairy cattle can be developed in the lowland areas of East Kolaka Regency with the LEISA pattern, but they must pay attention to the feeding pattern according to the physiological needs of dairy cattle.

Keywords | BCS, Cattle, Dairy, Digestibility, Feed, Intake

Received | July 06, 2025; **Accepted** | September 13, 2025; **Published** | November 10, 2025
***Correspondence** | Nur Santy Asminaya, Animal Science Department. Faculty of Animal Science. Halu Oleo University. Kendari. South East Sulawesi. Indonesia; **Email:** nur.asminaya@uho.ac.id
Citation | Asminaya NS, Auza FA, Abadi M, Agustina D, Tasse AM, Satria PA (2025). Existing conditions of LEISA dairy cattle farming in the lowlands, East Kolaka Regency. Adv. Anim. Vet. Sci., 13(11):2407-2415.
DOI | https://dx.doi.org/10.17582/journal.aavs/2025/13.11.2407.2415
ISSN (Online) | 2307-8316

INTRODUCTION

Dairy cows are ruminant livestock that produce milk over their calves' needs, so that their milk can be used to meet human nutritional needs. Dairy cow productivity is highly dependent on the availability of feed and the nutritional status of dairy cows. The better the nutritional status of dairy cows, the better the livestock productivity will be and vice versa. According to Periambawe *et al.* (2016), the nutritional status of cattle is largely determined by internal and external factors. Internal factors include genetics, livestock age, and livestock health, while external factors include weather, environmental conditions, availability of feed ingredients, and feed quality. Hendri *et al.* (2020) stated that adequate feed in terms of quantity, quality, and management of its provision can affect the genetic expression of dairy cows. Good livestock genetics will show good production performance if supported by good feed. Asminaya *et al.* (2018) added that the availability of feed will greatly determine the capacity, livestock density, livestock productivity, and the sustainability of dairy cattle farming businesses.

Adequate feed is closely related to the adequacy of animal feed nutrients. Therefore, feeding must be adjusted to the physiological status of the livestock so that the ideal weight of the livestock can be obtained. Adequate feed, body weight, and ideal performance of dairy cattle can be evaluated through the Body Condition Scoring (BCS) assessment. Nurhaliza dan Humaidah (2023) stated that BCS and body weight of dairy cattle are benchmarks that can be used to evaluate and assess the success of dairy cattle productivity. This benchmark can be used as a reference to minimize the occurrence of various post-partum problems such as disorders of the reproductive system, excessive weight loss, and decreased milk production. According to Siska dan Anggrayni (2021), BCS affects the milk production of Holstein Friesian crossbred cattle. Netika *et al.* (2020) added that milk production will decrease with increasing BCS value. The BCS value also affects services per conception in cattle (Harmayani *et al.*, 2023).

Currently, milk production in Indonesia has only reached 1 million tons (21%) of the total requirement of 4.7 million tons. This milk production is produced by 540,657 dairy cows spread across the islands of Java (478,098), Sumatra (6,631), Sulawesi (807), Kalimantan (270), and Papua (3) (Directorate General of Animal Husbandry and Animal Health, 2025). This milk production is not sufficient for national needs, so the government has taken steps to distribute dairy cattle seeds to areas with extensive natural resources and grazing fields, one of which is East Kolaka Regency, Southeast Sulawesi Province. The steps taken are also strategic steps to meet the need for protein from milk and prevent stunting in children, especially in East Kolaka Regency, Southeast Sulawesi Province. This area was then designated as a dairy cattle development area through the Regent's Decree Number: 100.3.3.2/92 of 2023 concerning the Determination of Dairy Cattle Development Areas in East Kolaka Regency.

East Kolaka Regency has quite good potential as a place for developing ruminant livestock because it has quite adequate natural resources with quite good agricultural potential (Sandiah *et al.*, 2021). In East Kolaka Regency, especially Wesalo Village, Lalolae District, the government has distributed 10 dairy cows to be developed. In East Kolaka Regency, specifically in Wesalo Village, Lalolae District, the government has distributed 10 dairy cows for breeding, but four of them died during the breeding process. This mortality rate is suspected to be due to the breeders' inadequate husbandry practices. Wesalo Village is a lowland area with quite good agricultural and plantation crop potential, so it has good feed resource potential. The maintenance system applied by farmers so far is an intensive maintenance system using a conventional single-stall type pen. Farmers apply the Low External Input Sustainable Agriculture (LEISA) pattern in raising dairy cattle, namely planting odot grass in the grass garden around the pen and using manure produced by dairy cows on the plants. Asminaya *et al.* (2018) stated that the LEISA pattern can be applied to dairy cattle farming by utilizing manure as compost on elephant grass garden land, and elephant grass is used as feed for dairy cows. However, in the maintenance process, 4 dairy cows died. Therefore, a comprehensive evaluation of the dairy cattle maintenance process is needed to determine what solutions are provided to develop dairy cattle in the area. The evaluations carried out include the availability and potential of odot grass, feed consumption and digestibility, BCS, and physiological responses of dairy cattle. The physiological response of dairy cattle is related to the level of feed consumption and digestibility. The results of this study are expected to be the basis for the development of dairy cattle in the lowland areas of East Kolaka Regency and a reference for further research.

MATERIALS AND METHODS

Study area

This research was conducted in a dairy farm that applies the LEISA maintenance pattern in the lowland area of Waselo Village, Lalolae District, East Kolaka Regency. Analysis of feed quality, digestibility, and fermentability was carried out at the Animal Nutrition and Feed Science Laboratory, Faculty of Animal Husbandry, Halu Oleo University, Kendari, South East of Sulawesi, Indonesia.

Research animals

The dairy cattle used in this study were the entire population of dairy cattle in Wesalo Village, Lalolae District, East Kolaka Regency, which was 6 cows. The dairy cattle observed in this study were heifers, approximately 3 years old, with body weights ranging from 266.5 to 435.0 kg.

Research methods

Availability and production potential of odot grass

Odot grass samples per hectare were taken using the tiling method, namely by measuring representative sample plots (2.5x2.5 m), which were then placed randomly at five points in different land locations, and after that, the grass in the sample plot was harvested to measure its weight. Sampling of odot grass was done by cutting the plant stem ± 10-15 cm from the ground surface, then weighing and oven-drying at 60 °C until the weight was constant. The forage samples were analyzed for Dry Matter (DM) content, Organic Matter (OM), Crude Protein (CP), Crude Fiber (CS), and Extracted Material Without Nitrogen (AOAC 2005). The research variables observed included nutrient content (DM, OM, CF, and TDN); forage nutrient production and potential for odot grass production as dairy cattle feed in Wesalo Village. Forage nutrient production was calculated using the following calculation:

DM production (tonnes/year) = fresh forage production (tonnes/year) x DM content (%)

CP production tons/year) = DM production

(tons/year) x CP content (%)
TDN production (tonnes/year) = DM production (tonnes/year) x TDN content (%)

Forage production potential is calculated:

Feed intake and digestibility

Feed intake measurements were carried out every day for 1 month by calculating the difference between the feed given and the remaining feed the next day. The calculated feed intake is the feed intake usually given by breeders during the maintenance period, namely, odot grass. Feed nutrient intake was calculated using the formula (McDonald *et al*., 2002):

DM intake = feed given (g/head/day) (% DM) – remaining feed (g/head/day) (% DM)
Nutrient intake (g/head/day) = DM intake (g/head/day) x % feed nutrient content

In vitro feed digestibility is determined by weighing and crushing the feed ingredients to be tested, then preparing the rumen fluid of healthy ruminants as a source of microorganisms. A buffer solution is then prepared to maintain optimal pH conditions for rumen fermentation. The feed sample, rumen fluid, and buffer solution are mixed in a closed container and incubated at 39°C for 48 hours. In vitro feed digestibility is calculated using the formula:

Digestibility (%) = ([Initial weight of sample - Residue weight - Blank weight] / Initial weight of sample) x 100%

In vivo feed digestibility was determined using the total collection method. Fecal collection was conducted during the last seven days of the experiment by placing metabolic trays under individual cages. Feces from each animal were collected, weighed, and sampled (10%), then dried at 60°C for 48 hours before proximate analysis and digestibility testing. Apparent nutrient digestibility was calculated using the formula:

Digestibility (%) = [(nutrient in feed – nutrient in feces) /nutrient in feed] x 100

Body condition scoring (BCS)

BCS measurement refers to Edmonson *et al*. (1989), which uses a scale of 1–5, namely value 1: very thin. value 2: thin. value 3: moderate. value 4 fat, and value 5: very fat.

Physiological response

The physiological responses of dairy cows observed include rectal temperature, skin temperature, body temperature, heart rate, and respiratory rate. Measurements were taken every 4 hours starting at 08.00 - 16.00 WIB for 30 days. Rectal temperature was measured using a rectal thermometer, and skin temperature was measured using a Digital Surface Temperature device. Measurements were taken at 4 points. namely, on the back, right behind the shoulder. chest right behind the armpit. upper front leg and lower leg (metacarpus). The average skin temperature and body temperature were calculated based on the formula of McLean *et al*. (1984). The respiratory rate per minute was calculated by observing the movement of the part between the last rib and the flank. Heart rate per minute was measured using a stethoscope by counting the number of beats in the upper left chest. near the left axilla (near the armpit).

Data analysis

The data obtained were tabulated using MS Excel and then analyzed using statistical methods: 1: central tendency measures to determine the mean of each observed variable; 2: data variability using standard deviation to describe the distribution of research data; and 3: data visualization using tables and figures to make the data presentation easier to understand. Furthermore, the data were presented descriptively to describe the availability and potential of feed, feed nutrient intake, BCS, and physiological responses of dairy cattle raised using the LEISA pattern in the lowlands of Wesalo Village, Lalolae District, East Kolaka Regency.

RESULTS AND DISCUSSION

Availability and production potential of odot grass

The results of the study showed that odot grass as dairy cattle feed in Wesalo Village is quite available throughout the year. This can be seen from the production of fresh odot grass biomass planted using dairy cattle manure, which is 330.17 tons/ha/year (179.66 ton/ha in rainy season and 150.50 ton/ha in dry season) or in dry matter of 46.29 tons/ha/year, with the number of dairy cattle that can be accommodated as many as 24.62 AU in a year (31.55 AU in rainy season and 19.51 AU in dry season) (Table 1). In this study, only 6 dairy cattle were kept so that the available feed can be used by livestock for 4 years, or in other words, the number of dairy cattle kept can be increased by 18.62 AU if the use of grass is optimized for 1 year. The production of odot grass in this study was in the range of odot grass production in the study of Sada *et al*. (2018), ie, 49.39-57.71 tons/ha per harvest or 345.73-403.97 tons/ha/year. However, the production of odot grass in this study tended to be higher than the study of Hendarto *et al*. (2020), which is 229.14 tons/ha/year using manure and NPK. Hardianto *et al*. (2021) stated that the production of the second odot ratun grass on post-mining land using biochar and goat manure is 34.09-53.47 tons/harvest or 238.63-374.29 tons/year. The odot grass planted in this study used dairy cow manure as the LEISA application. Dairy cow manure-based organic fertilizer is applied to the grassy garden after mowing the odot grass. Grass is mowed three times during the rainy season and four times during the dry season. Watering plants is rarely done in the rainy season, while in the dry season watering is done twice a day. The difference in elephant grass production in this study from other studies is due to differences in soil types and organic materials. used. Odot grass production is influenced by soil nutrient levels (Dewi, 2018); different types of soil and sources of organic matter can cause differences in fresh weight of odot grass (Araujo *et al.*, 2019; Hendarto *et al.*, 2020); climate and maintenance system (Balestrini *et al.*, 2022); and harvest age (Ressie *et al.*, 2018; Takdir *et al.*, 2021); planting distance (Riyanto *et al.*, 2022); land fertility (Rinduwati *et al.*, 2023).

Table 1: Availability and production potential of odot grass in dairy farms in the lowlands of East Kolaka Regency.

Research variables	Rainy season	Dry season	a year
Biomass production (tons/ha)	179.66	150.50	330.17
Age of cutting grass (days)	35-40	50-55	
Nutritional composition (%)			
Dry matter	14.01	16.75	15.39
Organic matter	91.03	84.64	87.84
Crude protein	18.33	18.96	18.65
Crude fiber	20.07	31.76	25.92
Crude fat	0.41	1.54	0.98
TDN	72.48	67.46	69.97
DM digestibility	64.83	56.21	60.52
OM digestibility	61.19	52.78	56.99
Potential nutrient production (%)			
Dry matter	2.110.05	3.009.34	5.079.59
Organic matter	13.700.30	15.206.58	29.000.04
Crude protein	2.758.72	3.406.39	6.155.93
Crude fiber	3.020.60	5.706.06	8.556.23
Crude fat	61.71	276.68	321.91
TDN	10.908.47	12.119.99	23.101.65
Dairy cow capacity (AU)	31.55	19.51	24.62
Soil quality	Clay	Sandy loam	
Fertilization	Organic fertilizer after harvest	Organic fertilizer after harvest	
Watering	Rarely	2 times a day	

The odot grass in this study had good nutrient levels, namely 14.02% DM, 91.03% OM, 18.33% CP, and 72.48 TDN in the rainy season, and 16.75% DM, 84.64% OM, 18.96% CP, and 67.46 TDN in the dry season. The DM levels in this study tended to be the same as the results of the study by Chalis *et al.* (2023), ie, 14.41% and CP, ie, 17.74-20.20% (Akbarillah *et al.*, 2024) and 12.65% (Dumadi *et al.*, 2021). Factors that affect CP content are defoliation (cutting time) and cutting age (Akbarillah *et al.*, 2024).

Feed intake

Feed intake in dairy cattle raised with the LEISA pattern in the lowlands of Wesalo Village, Lalolae District, East Kolaka Regency is presented in Table 2. The results of the study showed that the average value of DMI of dairy cattle in this study was 2.05 kg/head/day in the rainy season and 1.63 kg/head/day in the dry season. The DMI in this study did not reach the ideal intake based on the need for 3% of the body weight of dairy cattle, which should be 12.86 kg/head/day. The low DMI in this study was caused by the provision of feed dominated by young greens (odot grass) and leaves that were not accompanied by lower stems. The DMI in this study did not meet the dry matter requirements of the feed, so feeding needed to be increased by providing whole greens (stems and leaves) and concentrate. The DMI in this study was lower than Asminaya *et al.* (2017a), ie, 6.10-13.06 kg/head/day; Asminaya *et al.* (2017b), ie, 6.12-11.08 kg/head/day; Rinaldi *et al.* (2017), ie, 16.32 kg/head/day. Research by Asminaya *et al* (2017a, b) showed higher DMI values because the feed given consisted of whole greens consisting of stems and leaves as well as concentrate so that the dry matter content of the feed consumed tended to be higher. According to Cahyono *et al.* (2015), the DMI is influenced by several factors, namely body weight, age, physiological status and physical properties, and chemical composition of the ration. Saingo *et al.* (2021) stated that feed intake in livestock varies greatly depending on the species of livestock, body weight, body size, age and condition of livestock, physiological status, condition and capacity of the digestive tract, palatability of feed ingredients, type and physical properties of feed, energy content, water availability and environment. The low DMI in this study is likely due to dairy cows tending to consume more drinking water than feed. The temperature in the lowlands tends to be higher than the temperature in the highlands, so that livestock will drink more, but their appetite decreases (Heraini *et al.*, 2019).

Table 2 shows that the average CPI is 0.38 kg/head/day in the rainy season and is 0.30 kg/head/day in the dry season. CPI did not meet the ideal CP requirement based on the requirement of 12% of DMI, ie, 1.32 kg/head/day. The low CPI is due to the low DMI in this study. In addition, the low CPI in this study was also caused by the provision of single green feed without concentrate. Asminaya *et al.* (2025) stated that providing concentrate supplemented

Table 2: Feed consumption of dairy cattle raised using the LEISA pattern in the lowlands of East Kolaka Regency.

Dairy cow	Body weight (kg)	DMI (kg/ head/day)	DM needs-NRRDC (kg/ head/ day)	OMI (kg/ head/ day)	CPI (kg/head/ day)	CP needs - NRRDC (kg/ head/ day)	TDN (kg/ head/ day)	TDN NR-RCD (kg/ head/ day)
Rainy season								
1	426.75	2.21 ± 0.43	14.94	2.01 ±0.43	0.40 ± 0.00	1.54	1.60±0.34	10.83
2	351.50	1.67 ± 0.32	12.30	1.52 ±0.32	0.31 ± 0.00	1.27	1.21±0.25	8.92
3	266.50	2.17 ± 0.45	9.33	1.97 ±0.44	0.40 ± 0.00	0.96	1.57±0.35	6.76
4	365.50	2.12 ± 0.41	12.79	1.93 ±0.41	0.39 ± 0.00	1.32	1.54±0.33	9.27
5	359.00	1.79 ± 0.39	12.57	1.63 ±0.39	0.33 ± 0.00	1.29	1.30±0.31	9.11
6	435.00	2.36 ± 0.57	15.23	2.15 ±0.57	0.43 ± 0.00	1.57	1.71±0.45	11.04
Average	367.38	2.05 ± 0.43	12.86	1.87 ±0.43	0.38 ± 0.01	1.32	1.49±0.34	9.32
Dry season								
1	365.00	2.10 ± 0.63	12.78	1.91 ±0.58	0.38 ± 0.12	1.53	1.52±0.46	9.26
2	355.00	1.21 ± 0.44	12.43	1.10 ±0.40	0.22± 0.08	1.49	0.88±0.32	9.01
3	273.50	1.59 ± 0.62	9.57	1.45 ±0.56	0.29 ± 0.11	1.15	1.16±0.45	6.94
4	436.00	1.47 ± 0.35	15.26	1.34 ±0.32	0.27 ± 0.06	1.83	1.07 ±0.25	11.06
5	345.50	1.21 ± 0.29	12.09	1.11 ±0.26	0.22 ± 0.05	1.45	0.88±0.21	8.76
6	428.00	2.22 ± 0.95	14.98	2.02 ±0.87	0.41 ± 0.17	1.80	1.61±0.69	10.86
Average	367.20	1.63 ± 0.55	12.85	1.87 ±0.50	0.30 ± 0.10	1.54	1.18±0.40	9.31

Note: DMI: dry matter intake; DM: dry matter; OMI: organic matter intake; OM: organic matter; CPI: crude protein intake, CP: crude protein; TDN: Total digestible nutrient; NRRDC: Nutrient Requirements of Ruminants in Developing Countries.

with soybean oil can increase milk production. According to Polii *et al.* (2020), the amount of feed consumed will affect the amount of other nutrients consumed, so that the more feed consumed will increase the consumption of other nutrients in the feed. CPI in this study was lower than Asminaya *et al.* (2017a), ie, 0.77-1.36 kg/head/day; Asminaya *et al.* (2017b), ie, 0.80-1.48 kg/head/day; Rinaldi *et al.* (2017), ie, 1.78 kg/head/day; and Adi *et al.* (2020), ie, 1.59 - 1.69 kg/head/day. According to Tahuk *et al.* (2021), CPI is not only influenced by the DMI but also by its digestibility, the effect of fermentation in the rumen, the effect of digestive enzymes, metabolism by microbes, and feed quality. CPI in livestock must be in line with livestock needs because protein is used to help microbes synthesize microbial protein in the rumen, so that the number of microbes increases and can optimize feed absorption (Waldi *et al.*, 2017). The protein consumed will be hydrolyzed in the rumen into peptides, then into amino acids, which will be converted into amines and, if excessive, will be excreted with urine and feces (Syafri *et al.*, 2014).

The amount of digestible nutrients (TDN) of dairy cattle in this study was 1.49 kg/head/day in the rainy season and 1.18 kg/head/day in the dry season. The TDN of dairy cattle in this study did not meet the ideal livestock needs according to NRRDC, ie, 9.32 kg/head/day. The low TDN intake in this study was caused by low DMI. TDN intake in this study tended to be lower than Asminaya *et al.* (2017a), ie, 4.12-8.25 kg/head/day, and Asminaya *et al.* (2017b), ie, 4.43-7.03 kg/head/day; Rinaldi *et al.* (2017), ie, 11.33 kg/head/day; and Adi *et al.* (2020), ie, 6.90-9.59 kg/head/day. The TDN value indicates the amount of energy that can be digested and used by dairy cattle from the feed they consume. In this study, the TDN value was quite low because the DMI was also low, so that the energy that could be digested and used by dairy cows was also small; as a result, dairy cows could not show good production and reproductive performance. This is reflected in dairy cows that always fail AI, and the death of 4 dairy cows during the 3-year maintenance process.

Feed digestiveness

The digestibility of dairy cattle feed maintained using the LEISA pattern in the lowlands of Wesalo Village, Lalolae District, East Kolaka Regency, is presented in Table 3. The average DM digestibility in this study was 82.73% in the rainy season and 78.53% in the dry season. The DM digestibility value in this study was higher than the studies of Novianti *et al.* (2014), ie, 61.01-63.32; Klau *et al.* (2020), ie, 77.12-80.52; and Amatullah *et al.* (2022), ie, 51.54-65.56%. The high DM digestibility value in this study was due to the odot grass consumed by livestock being young greens and leaves without stems. Young greens generally have a higher digestibility level than old greens because of their lower crude fiber content and higher nutrient content. The high dry matter digestibility value in this study indicates that most of the crude fiber, protein, and carbohydrates in the feed can be broken down by rumen microbes into energy and simpler substances, which are then absorbed and utilized by the body for biological functions. According to Novianti *et al.* (2014), DM digestibility is influenced by the amount of ration consumed, the rate of food travel in the digestive tract, and the type of nutritional content contained in the ration, ration, chemical composition, ration protein level, percentage of fat, and minerals. Feed digestibility is closely related to feed intake because the provision of old green fodder causes the feed to be digested slowly and is voluminous.

Table 3: Feed digestibility of dairy cattle raised using the LEISA pattern in the lowlands of East Kolaka Regency.

Dairy cow	DM digestibility (%)	OM digestibility (%)	CP digestibility (%)
Rainy season			
1	84.18±4.04	59.45±1.04	52.30±1.22
2	79.19±4.70	46.64±1.20	37.23±1.42
3	83.87±3.92	58.65±1.01	51.36±1.18
4	83.68±3.48	58.16±0.89	50.79±1.05
5	80.50±4.52	50.00±1.16	41.18±1.36
6	84.98±4.06	61.50±1.04	54.71±1.22
Average	82.73±4.12	57.73±1.06	47.93±1.24
Dry season			
1	84.20±6.54	59.49±1.58	52.35±1.86
2	72.56±6.21	29.64±1.51	17.23±1.68
3	79.20±5.29	46.68±1.19	37.28±1.41
4	77.47±2.75	42.24±0.81	32.06±0.95
5	72.69±3.34	29.98±0.98	17.64±1.15
6	85.03±6.42	61.62±1.43	54.85±1.68
Average	78.53±5.09	44.94±1.26	35.24±1.49

The digestibility value of OM in this study was 57.73% in the rainy season and 44.94% in the dry season. The OM digestibility reflects the amount of feed nutrients that can be absorbed by the livestock's body. The OM digestibility in this study tended to be lower than Novianti *et al.* (2014), ie, 62.66-64.92%; Nugraheni *et al.* (2020) and Amatullah *et al.* (2022), ie, 67.52-82.75%. Nugraheni *et al.* (2020) stated that the DM digestibility of feed is directly proportional to the OM digestibility of feed because OM is part of the DM, so that the size of the DM digestibility value will affect the size of the OM digestibility. The digestibility value of CP in this study was 47.93% in the rainy season and 35.24% in the dry season. The CP digestibility in this study was lower than Polii *et al.* (2020), ie, 82.18-85.34%.

Body condition scoring

Dairy cows raised with the LEISA pattern in the lowlands of East Kolaka Regency have an average BCS value of 2.5 or a moderate category. This BCS value is obtained, showing that the pelvic bones and ribs of dairy cows show clearly visible bone angles. Cows 1, 2, and 6 have a BCS value of 3 or a moderate category (Figure 1). In these cows, the vulva looks flatter and the tailbone looks rounded. The spinous process can be felt if touched. The tuber coxae and tuber ischiadicus are rounded more smoothly, the spine and ribs can be felt with hand pressure, and a moderate layer of fat is felt, the hip and pin bones are visible, the rump looks flat and begins to fill with fat, and a thin layer of fat can be felt. The base of the tail is slightly convex, and a layer of fat can be felt. Cows 3,4, and 5 have a BCS value of 2 or a thin category (Figure 1). In these cows, the vulva protrusion is not very distinct. The spinous process is short and can be felt; the tuber coxae and tuber ischiadicus are slightly visible. At the top of the spine still forms a sharp protrusion, ribs are clearly visible and can be directly held, there is no layer of fat/ a very thin layer of fat is felt, hip bones and pins are visible, rump looks concave can be directly held, thin fat is felt on both bones and at the base of the tail it looks concave and a thin layer of fat can be felt.

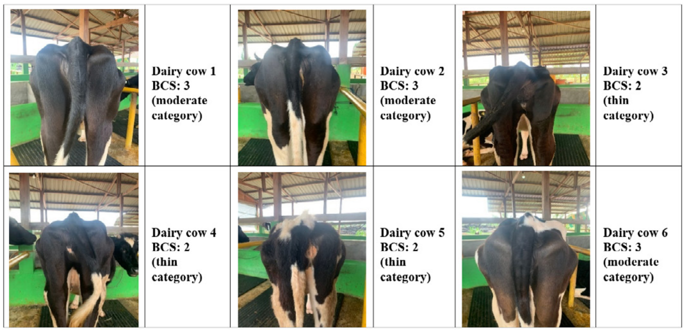

Figure 1: Body Condition Score (BCS) of dairy cattle raised using the LEISA pattern in the lowlands of East Kolaka Regency. Cows 1, 2, and 6 scored 3 (moderate); cows 3, 4, and 5 scored 2 (thin).

The results of this study show that the BCS value tends to be the same as the results of the study by Siska and Anggrayni (2021), ie, 2.60, and tends to be lower than Nurnaningsih *et al.* (2021), ie, 3.22. This is likely due to the low consumption of dairy cattle feed, so that livestock use their body fat deposits and causing livestock to be thin and ribs to be very visible. Siska and Anggrayni (2021) stated that if feed consumption is low, it can cause fat reserves in the body to be used to meet basic living needs, so that the BCS of livestock becomes smaller.

Physiological response

The physiological responses of dairy cattle reared using the LEISA pattern on dairy farms in East Kolaka Regency are presented in Table 4. The body temperature of dairy cows in this study was at 39.41 °C (in the morning) and 38.19 °C (in the afternoon). This body temperature illustrates that dairy cows are still in a comfortable condition. However, during the day, the body temperature of dairy cows increases to

40.08 °C, meaning that dairy cows are starting to be at a stress level. Yani and Purwanto (2006) stated that the body temperature of dairy cows in the comfort zone is 38.60 °C. Rectal temperature, respiration rate, and heart rate in this study were generally still within the normal range (Table 3). Yani and Purwanto (2006) stated that the rectal temperature, respiration rate, and heart rate of dairy cows in normal conditions were respectively 38.70-38.80 °C, 31.00-48.00 times per minute, and 64.0-77.0 times per minute. Meanwhile, the rectal temperature, respiration rate, and heart rate of dairy cows under stress conditions were respectively 39.8-40.0 °C, 75.00-87.00 times per minute, and 67.0-79.0 times per minute.

Table 4: Physiological responses of dairy cows raised using the LEISA pattern in the lowlands of East Kolaka Regency.

Time (central indonesian time)	Respon fisiologis			
	Body Temp. (°C)	Rectal Temp. (°C)	Respiratory rate (times per minute)	Heart rate (beats per minute)
06.00	39.41±0.69	38.03±0.91	27.22±3.58	68.66±7.19
12.00	40.08±0.26	38.23±0.44	28.78±3.88	69.62±6.88
18.00	38.19±0.48	38.23±0.43	28.14±3.81	69.44±6.39
Average	39.23±0.48	38.16±0.59	28.05±3.76	69.24±6.82

The ambient temperature during the study (06.00-18.00 WITA) ranged from 23.50-32.30 °C with THI ranged from 72 to 84, and the temperature inside the barn ranged from 29.35-35.90 °C with THI ranging from 80 Dairy cow feed intake did not meet the nutrient needs of the feed -88. According to Bohmanova *et al.* (2007), a comfortable THI for dairy cows is <72. Yani and Purwanto (2006) stated that optimal dairy cow production can be achieved if dairy cows are kept at a temperature of 18.30 °C with a humidity of 55%. If dairy cows are kept at this temperature, the livestock will make physiological and behavioral adjustments. Livestock are usually more selective in reducing green fodder, relatively choosing concentrate as an effort to reduce body temperature by reducing heat production from fermentation, digestion, and other metabolic processes (Nugraheni *et al.*, 2020).

CONCLUSIONS AND RECOMMENDATIONS

Odot grass in dairy farms is available in sufficient abundance, and the number of dairy cows can be increased to 24.62 AU. Dairy cow feed intake did not meet the animals' nutrient requirements, namely DM, CP, and TDN. The digestibility value of the DM in this study tends to be higher, ie, 82.73%. The BCS value of livestock shows a figure of 2.5 (moderate). The physiological response of livestock shows that dairy cows are still in a comfortable condition with the environmental temperature in the lowland areas of East Kolaka Regency. Dairy cows can be developed in the lowland areas of East Kolaka Regency with the LEISA pattern, but they must pay attention to the feeding pattern that is in accordance with the physiological needs of dairy cows.

ACKNOWLEDGEMENTS

The authors contributed equally to this work.

NOVELTY STATEMENT

Research on the existing condition of dairy cattle in the lowland areas of East Kolaka Regency with the LEISA pattern was conducted as one way to ensure that dairy cattle have the potential and can be developed in the area. The data studied include: feed availability, feed consumption and digestibility, BCS, and physiological responses of dairy cattle. The data obtained from the results of this study are expected to be initial information in determining strategic steps and policies for developing dairy cattle with the LEISA pattern in the lowland areas of East Kolaka Regency. The results of the study are expected to be recommendations for the local government and become references for further research.

AUTHOR'S CONTRIBUTION

NSA: Idea and design and also write the manuscript and revision.
DA, FAA and AMT: Laboratorium and data analysis.
MA and PAS: Sample and data collection.

Generative AI and AI-assisted technology statement

The authors declare that no Genrative AI was used in the creation of this manuscript.

Conflict of interest

The authors have declared no conflict of interest.

REFERENCES

Adi DS, Harjanti DW, Hartanto R (2020). Evaluasi konsumsi protein dan energi terhadap produksi susu sapi perah awal laktasi. J. Petern. Indonesia, 22(3): 292. https://doi.org/10.25077/jpi.22.3.292-305.2020

Akbarillah T, Hidayat, Pardede RP, Sinaturi AC, Gultom D (2024). Pengaruh Umur Potong yang Berbeda terhadap Keragaan dan Kandungan Gizi Rumput Odot (*Pennisetum purpureum cv.* Mott). Bull. Petern. Trop., 5(1): 63–68. https://doi.org/10.31186/bpt.5.1.63-68

Amatullah DA, Ilyas G, Awaliya EN, Aldila NA, Hernaman I, Ayuningsih B, Tanuwiria H, Hidayat R (2022).

fermentabilitas dan kecernaan ransum yang mengandung bungkil kacang tanah (*in vitro*). J. Ilmu Ternak Univ. Padjadjaran. 22(2): 118. https://doi.org/10.24198/jit.v22i2.39773

AOAC. (2005). Official Methods of Analysis Association of Official Analytical Chemist. Washington: Benjamin Franklin Station.

Araujo CD, Un MY, Koten BB, Randu MDS, Wea R (2019). Pertumbuhan dan produksi rumput odot (*Pennisetum purpureum* cv. Mott) pada tanah entisol di lahan kering akibat pemberian pupuk organik cair berbahan feses babi dengan volume air berbeda. J. Ilmu Petern. Terapan. 3(1): 6–13. https://doi.org/10.25047/jipt.v3i1.1902

Asminaya NS, Bain A, Tasse AM, Sandiah N, Aka R, Has H, Agustina D, Pratiwi A, Indi A (2025). Effectiveness of supplementation of soybean oil (cas soybean) in local feed-based concentrate on etawa crossbred goat productivity. IOP Conf. Ser. Earth Environ. Sci., 1502: 012003. https://doi.org/10.1088/1755-1315/1502/1/012003

Asminaya NS, Purwanto BP, Atabany A, Nurlaha (2018). Ecological sustainability of smallholder dairy farm with LEISA pattern. J. Ilmu Teknol. Petern., 5(2): 78-87.

Asminaya NS, Purwanto BP, Nahrowi, Ridwan WA, Atabany A (2017a). Efficiency of milk production and feed efficiency FH crossbreed fed rice straw during dry season. Int. J. Sci. Basic Appl. Res., 34(1): 193–203.

Asminaya NS, Purwanto BP, Nahrowi, Ridwan WA, Atabany A (2017b). Milk yield and nutrient adequacy of lactating dairy cow fed based on tofu waste, soybean hulls and straw. Int. J. Sci. Res., 6(7): 951–956. https://doi.org/10.21275/ART20174879

Balestrini R, Chitarra W, Ghirardo A, Nardini A, Nerva L (2022). A stressful life: How plants cope with multiple biotic and abiotic adverse factors. Plant Stress. 5(May): 4–6. https://doi.org/10.1016/j.stress.2022.100095

Bohmanova J., Misztal I., Cole J. B. (2007). Temperature-humidity indices as indicators of milk production losses due to heat stress. J. Dair. Sci., 90: 1947–1956. doi: 10.3168/jds.2006-513

Cahyono BD, Sulistyowati E, Badarina I (2015). Kecernaan nutrisi konsentrat-pufa yang mengandung curmiyeast pada sapi perah laktasi nutrient digestibility of PUFA-concentrate containing curmiyeast in lactating dairy cows. J. Sain Petern. Indonesia, 10(1): 59. https://doi.org/10.31186/jspi.id.10.1.59-70

Chalis, Fikran M, Wajizah S (2023). Evaluasi kualitas nutrisi silase rumput odot yang diinokulasi dengan lactobacillus plantarum dan kluyveromyces lactis. J. Ilmiah Mahasiswa Pertan., 8(3): 296–305. www.jim.unsyiah.ac.id/JFP.

Dewi DPR (2018). Produksi rumput (*Pennisetum purpureum cv.* Mott) defoliasi pertama dengan jenis pupuk yang berbeda. J. Ilmu Petern., 11(2): 7. https://doi.org/10.30957/aves.v11i2.280

Directorate General of Animal Husbandry and Animal Health (2025). Percepatan peningkatan produksi susu dan daing nasional. Webinar nasional hari susu nusantara Fakultas Peternakan Universitas Andalas "Inovasi dan keberlanjutan produksi dalam mencegah stunting. Padang, 11 Juni 2025.

Dumadi EH, Abdullah L, Sukria HA (2021). Kualitas hijauan rumput gajah (*Pennisetum purpureum*) berbeda tipe pertumbuhan: Review kuantitatif. J. Ilmu Nutr. Teknol. Pak., 19(1): 6–13. https://doi.org/10.29244/jintp.19.1.6-13

Edmonson AJ, Lean IJ, Weaver LD, Farver T, Webster G (1989). A Body condition scoring chart for holstein dairy cows. J. Dairy Sci., 72(1): 68-78. https://doi.org/10.3168/jds.S0022-0302(89)79081-0

Hardianto H, Kurniawan W, Asminaya NS (2021). Produktivitas rumput odot (*Pennisetum purpureum cv.* Mott) ratun kedua pada tanah pasca tambang nikel dengan aplikasi biochar dan pupuk kandang kambing. J. Ilmiah Petern. Halu Oleo, 3(3): 353. https://doi.org/10.56625/jipho.v3i3.19697

Harmayani R, Alimuddin A, Azima F (2023). Hubungan body condition score dengan service per conception pada induk sapi bali di Dusun Tempos Desa Tempos Kecamatan Gerung Lombok Barat. J. Sains Teknol. Lingkungan, 9(2): 368–378. https://doi.org/10.29303/jstl.v9i2.438

Hendarto E, Qohar AF, Hidayat N, Bahrun, Harwanto (2020). Produksi dan daya tampung rumput odot (*Pennisetum purpureum cv.* Mott) pada berbagai kombinasi pupuk kandang dan NPK. Prosiding Seminar Teknologi dan Agribisnis Peternakan VII–Webinar: Prospek Peternakan di Era Normal Baru Pasca Pandemi COVID-19. 7(7): 751–758. http://jnp.fapet.unsoed.ac.id/index.php/psv/article/view/521.

Hendri J, Alfian A, Jaka A (2020). Evaluasi keseimbangan nutrisi sapi perah betina dewasa di UPTD Puskeswan Kota Padang. J. Petern. Mahaputra, 1(1): 34-46.

Heraini D, Purwanto BP, Suryahadi S (2019). Perbandingan suhu lingkungan dan pengaruh pakan terhadap produktivitas sapi perah di daerah dengan ketinggian berbeda. J. Ilmiah Petern. Terpadu. 7(2): 234. https://doi.org/10.23960/jipt.v7i2.p234-240

Klau MY, Pendong AF, Tuturoong RAV, Waani MR (2020). Kecernaan energi dan kecernaan nutrien total pada ternak sapi perah yang diberikan pakan lengkap berbasis tebon jagung. Zootec. 40(2): 561. https://doi.org/10.35792/zot.40.2.2020.29478

McDonald P, Edward RA, Greenhalgh JFD, Morgan CA (2002). Animal nutrition, 6th Edition. Longman, London and New York.

McLean AJ, Clark MS, Dorsch MM, Hulobowycz, McCaul (1984). Random breath testing in South Australia: Effects on drink driving, accidents, and casualties. University of Adelaide: NH & MRC Road Accident Research Unit

Netika M, Darsono R, Utomo B, Mustofa I, Isudiono, Suprayogi, TW (2020). Hubungan antara body condition score (bcs) dengan produksi susu sapi perah Friesian Holstein (FH). Ovozoa: J. Anim. Reprod., 8(2): 89. https://doi.org/10.20473/ovz.v8i2.2019.89-93

Novianti J, Purwanto BP, Atabany A (2014). Efisiensi produksi susu dan kecernaan rumput gajah (*Pennisetum purpureum*) pada sapi perah FH dengan pemberian ukuran potongan yang berbeda. J. Ilmu Prod. Teknol. Hasil Petern., 2(1): 243–250.

Nugraheni S, Hartanto R, Harjanti DW (2020). Kecernaan pakan sapi laktasi akibat modifikasi lingkungan kandang di perah teaching farm Universitas Diponegoro. Agromed. Berkala Ilmiah Ilmu-ilmu Pertanian. 38(1): 15–21. https://doi.org/10.47728/ag.v38i1.266

Nurhaliza N, Humaidah N (2023). Evaluasi body condition score (BCS) terhadap kejadian gangguan reproduksi sapi peranakan friesian holstein (PFH). J. Dinamika Rekasatwa, 6(1): 95–103.

Nurnaningsih W, Astuti T, Subagyo Y (2021). Korelasi produksi susu dengan bcs sapi friesian holstein laktasi pertama di BBPTU-HPT Baturraden. J. Petern. Nusantara, 7(1): 19.

https://doi.org/10.30997/jpn.v7i1.2963

Periambawe DKA, Sutrisna R, Liman (2016). Status nutrien sapi peranakan ongole di Kecamatan Tanjung Bintang Kabupaten Lampung Selatan. J. Ilmiah Peternakan Terpadu. 4(1): 6–12.

Polii DNY, Waani MR, Pendong AF (2020). Kecernaan protein kasar dan lemak kasar pada sapi perah peranakan fh (Friesian Holstein) yang diberi pakan lengkap berbasis tebon jagung. Zootec. 40(2): 482. https://doi.org/10.35792/zot.40.2.2020.28632

Ressie ML, Mullik ML, Dato TD (2018). Pengaruh pemupukan dan interval penyiraman terhadap pertumbuhan dan produksi rumput gajah odot (*Pennisetum purpereum cv* Mott). J. Sain Petern. Indonesia. 13(2): 182–188. https://doi.org/10.31186/jspi.id.13.2.182-188

Rinaldi R, Hernaman I, Ayuningsih B (2017). Evaluasi kecukupan nutrien pada sapi perah laktasi produksi sedang milik anggota koperasi di Koperasi Peternakan Bandung Selatan (KPBS) Pangalengan. Students e-Journal. 6(1): 1–7.

Rinduwati, Nohong B, Andika, Nursyamsi (2023). Pertumbuhan, produksi, dan kualitas rumput pakchong (*Pennisetum purpureum* cv. Thailand) yang diberi pupuk nitrogen berbeda. Bull. Nutr. Makanan Ternak, 17(1): 41–43.

Riyanto FA, Herijanto S, Rahardjo S (2022). Pengaruh jarak tanam terhadap produktivitas rumput odot (pennisetum purperium cvmoot) di padang penggembalaan maribaya Kecamatan Bumiayu. Media Peternakan, 24(2):1–11.

Sada SM, Koten BB, Ndoen B, Paga A, Toe P, Wea R, Ariyanto (2018). Pengaruh interval waktu pemberian pupuk organik cair berbahan baku keong mas terhadap pertumbuhan dan produksi hijauan *Pennisetum purpureum cv.* Mott. J. Ilmiah Inov., 18(1): 42–47. https://doi.org/10.25047/jii.v18i1.846

Saingo R, Sobang YU, Lestari GA (2021). The effect supplementation of consentrate feed containing fermented banana comb flour with Zn-biocomplex on the consumtion and digestibility of dry matter and organic matter of fattening bali cattle. J. Petern. Lahan Kering, 3(3)

Sandiah N, Zulkarnain D, Pagala MA, Munadi LO (2021). Potensi integrasi ternak ruminansia dan tanaman pangan di Kabupaten Kolaka Timur. J. Petern., 5(2): 81–86.

Siska I, Anggrayni YL (2021). Body condition score (BCS), tingkat laktasi dan hubungannya dengan produksi susu sapi perah Peranakan Friesian Holstein (PFH). Jurnal Ilmu Ternak Universitas Padjadjaran. 20(2): 115. https://doi.org/10.24198/jit.v20i2.30922

Syafri A, Harjanti DW, Santoso SAB (2014). Hubungan konsumsi protein pakan dengan produksi, kandungan protein dan laktosa susu sapi perah di Kota Salatiga. Proc. Natl. Acad. Sci., 3(1): 1–15.

Tahuk PK, Dethan AA, Sio S (2021). Konsumsi dan kecernaan bahan kering, bahan organik, dan protein kasar sapi bali jantan yang digemukkan di peternakan rakyat. J. Trop. Anim. Sci. Technol., 3(1): 21–35.

Takdir M, Asnidar, Wardi, Ishak ABL (2021). Pertumbuhan dan produksi rumput gajah mini (*Pennisetum purpureum cv.* Mott) yang diberi pupuk urea di sela pertanaman kelapa. Prosiding Seminar Nasional Rekarta (August): pp. 16–22.

Waldi L, Suryapratama W, Suhartati M (2017). Pengaruh penggunaan bungkil kedelai dan bungkil kelapa dalam ransum berbasis indeks sinkronisasi energi dan protein terhadap sintesis protein mikroba rumen sapi perah. J. Livest. Sci. Prod., 1(1): 1–12. https://doi.org/10.31002/jalspro.v1i1.446

Yani A, Purwanto BP (2006). Pengaruh iklim mikro terhadap respons fisiologis sapi peranakan fries holland dan modifikasi lingkungan untuk meningkatkan produktivitasnya (ulasan). Med. Petern., 29(56): 35–46.