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Identifying the Most Important Linear Body Depth Traits Associated with Milk Yield in Dairy Cattle

Identificando as características lineares de profundidade corporal mais relevantes relacionadas à produção de leite em gado leiteiro

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ABSTRACT

Depth dimensions are a fundamental linear type trait in the animal body included in dairy cattle science. Unfortunately, the prominent body depth dimension to milk yield is unspecified in lucidity. Thus, the objective of the current research was to identify the excellent body depth dimension of dairy cattle for milk yield as a selection precedence trait. The experiment employed 121 lactation Holstein cows aged specify as 2–6, raised on an Indonesian smallholder commercial dairy farm. R version 4.2.1 with RStudio software simultaneously worked as a statistical analysis tool. The principal component analysis (PCA), correlation, and regression analyses were executed sequentially. The product of the PCA revealed that the chest depth (CHD), body depth (BDD), and udder depth (UDD) traits are the essential body depth dimensions in dairy cattle. A crowning envoy associated with the milk yield capacity was delegated to the UDD trait. However, the UDD is the finest trait for the lactation cow selection program. Presumably, the BDD trait is the prime characteristic for calves and heifer selection schemes.

KEYWORDS: body measurement; correlation; depth dimension; Holstein cows; principal component.

RESUMO

As dimensões de profundidade são uma característica fundamental do tipo linear no corpo animal incluída na ciência do gado leiteiro. Infelizmente, a dimensão proeminente da profundidade do corpo para a produção de leite não é especificada na lucidez. Assim, o objetivo da presente pesquisa foi identificar a dimensão de profundidade corporal excelente de bovinos leiteiros para produção de leite como característica de precedência de seleção. O experimento empregou 121 vacas da raça Holandesa em lactação, com idades entre 2 e 6 anos, criadas em uma fazenda leiteira comercial de pequeno porte na Indonésia. R versão 4.2.1 com software RStudio funcionou simultaneamente como uma ferramenta de análise estatística. As análises de componentes principais (PCA), correlação e regressão foram executadas sequencialmente. O produto da PCA revelou que as características de profundidade do peito (CHD), profundidade do corpo (BDD) e profundidade do úbere (UDD) são as dimensões essenciais da profundidade do corpo em bovinos leiteiros. Um enviado de coroação associado à capacidade de produção de leite foi delegado ao traço UDD. No entanto, o UDD é a melhor característica para o programa de seleção de vacas em lactação. Presumivelmente, a característica BDD é a principal característica para esquemas de seleção de bezerras e novilhas.

PALAVRAS-CHAVE: medida corporal; correlação; dimensão de profundidade; vacas Holstein; principal componente.

INTRODUCTION

It was publicly known that body depth and belly depth size in humans is usually crucial measurement in garment industries (PETRAK et al. 2012). Body depth is also critical in the fish industries (JAYRAJ et al. 2019, BEACHAM & MURRAY 1985). The depth of the body, also a significant linear type trait, was implemented as an indicator of the horse's performance (WHITAKER & SEABROOK 2006). In concert, this dimension of the body was adopted in the dairy cattle sciences as well, especially to investigate the production capacity characteristics (BILAL et al. 2016). Regarding the various numbers of studies on the subject of the cattle linear type traits, there are several traits of body depth take pivotal places encompassing the neck depth (JUSTINA 2012), the chest depth (LI & TENG 2022), the body depth (ZINDOVE et al. 2015), and the udder depth (AFRIDI et al. 2022).

The depth dimension of cattle bodies is habitually pertinent with assorted prolific nature. As precedents, neck depth is a decisive linear type trait to specify cattle growth rates (SAMPURNA et al. 2014), chest depth has a little tie-in with milk yield aptitude positively (GOWEN 1933); meanwhile, body depth has a moderate genetic association with the milk yield, fat milk percentage, milk protein percentage, and somatic cell score (XUE et al. 2023), as the last is the udder depth also has a significant correlation with the somatic cell count and the milk yield in unison (JUOZAITIENE et al. 2004). Indubitably, a manifold of meritorious features is intended concerning the linear type traits, such as longevity characteristics (WILLIAMS et al. 2022), reproduction traits (MANDAL et al. 2022), udder-feet health properties (ROGERS 1996), estimated feed efficiency attributes (PARKE Jr et al. 1999), and even animal behaviour aspects (HIENDLEDER et al. 2003). Notwithstanding, the ongoing inquiry would merely concentrate on the interlinkage between the body depth dimension and the milk yield capacity. Due to the most potent-body depth linear type trait interconnected with the production capacity, chiefly milk yield potency up to the present day, it is unidentified with clarity. Hence, implementing a selection program for dairy cattle wastes more time, money, energy, and other resources. In other words, it becomes less of effectiveness and less efficient. Aftermath, pinpointing the superlative of body depth interlinked to the milk yield becomes an urgent topic of disclosure.

Exertion of the principal component analysis (PCA), correlation, and regression is expected to recognize the most remarkable body depth linear type trait interrelated with the milk yield characteristic. Due to this, the PCA has a faculty to reduce the dimensional of the large data sets (ARTONI et al. 2018). Subsequently, the correlation analysis is competent in quantifying the level of intercorrelation between two variables; meanwhile, the regression analysis is proficient in establishing a linear model to predict the dependent variable from the independent variable (TANNI et al. 2020). Ultimately, the vital body depth dimension relevant to the milk yield prowess could be eye sighted explicitly and creditable as a selection criterion for the milk yield-gaining program.

MATERIAL AND METHODS

Data amassment

Holstein breed was used as an animal trial specimen with 121 heads cow in amount. The profile of samples entered the lactation period entirely, and the age specified was 2 – 6 years old. The cattle stick gauge with an accuracy of 0.1 mm was utilized as a mensuration instrument. The scale unit of centimetres was enrolled to record the data. The cowshed is located in a tropical ambient. The research site was in Jombang district, East Java province, Indonesia. The type of ranch is a commercial dairy cattle farm.

About two to three hours after milking, dairy cattle's body depths data were collected in the morning. The two times a day milking frequency was adopted on this barn. Morning milking started at 05.00 AM and was accomplished at 06.00 AM. Meantime, the evening milking was initiated from 04.30 PM to 05.30 PM. Accordingly, the test-day interval method was used to gather milk yield data. Next, the total milk yield test-day (MYT) was accumulated (EVERETT & CARTER 1968, MIGOSE et al. 2020). Henceforward, the whole milk yield standardized 305-d (MYS) was considered to eliminate the bias of the length of the days in milk (DIM) differences among samples of dairy cattle (RUELLE et al. 2019). Parenthetically, the total milk yield matures equivalent (MYM) was calculated sequentially to minimize the sample's age discrepancy bias (GALLO et al. 1996). Generally, the body depths of dairy cattle conformation judging systems were applied in the present investigation following the International Agreement of Recording Practices – The Standard Trait Definition of Dairy Cattle (ICAR 2022). In detail, the number and translation of assessed body depth parameters are served in Table 1 and Figure 1 independently.

Table 1. The definition and badge of measured body depth traits.

Depth traits	Badge	Definition	References
Neck depth	NCD	Vertically crosswise quantified from uppermost to down most in the middle area of the neck (Fig. 1 light green colour)	(YOUNAS et al. 2013)
Chest depth	CHD	Vertically diagonal quantified begin at the uppermost to down most point in the thorax behind the front feet instantly (Fig. 1 purple colour)	(LE COZLER et al. 2019a)
Body depth	BDD	Perpendicular quantified in the deepest area behind the last rib (Fig. 1 red colour)	(GRUBER et al. 2018).
Udder depth	UDD	Plumb quantified started from the imaginer line horizontally of the hock to the down most point of the udder base (Fig. 1 blue line colour) – the udder base with the above position from the hock imaginer line is positively marked, and the below negatively scored.	(RIEKERINK et al. 2014)

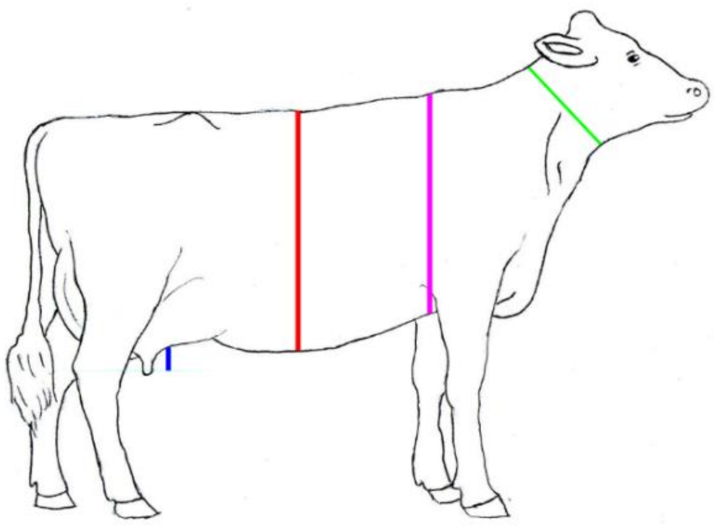


Figure 1. The illustration of body depth traits assessment.

The statistical analysis registered

Three statistical analyses comprising PCA, correlation, and regression analysis were enforced to respond to the issue addressed before. The statistical analysis was generated using R version 4.2.1 and RStudio software as an instrument. The math formula of the PCA is described as follows:

$$\gamma = U_d{}^T X$$ (ALMAIAH et al. 2022)

Meanwhile, the math model of correlation is illustrated as follows:

$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n\sum x^2 - (\sum x)^2}\sqrt{n\sum y^2 - (\sum y)^2}}$$ (KUMAR 2019)

Furthermore, the math equation of regression is presented as follows:

$$Y = \alpha + \sum_{i=1}^{k} \beta_i X_i$$ (AYÇAGUER & UTRA 2001)

The relationship level depends on the coefficient correlation score between positive 1 to negative 1 (KUMAR 2019). Notably, the stepwise method was applied to operate the regression analysis.

RESULTS AND DISCUSSION

Illustrating the data statistically descriptively is needed to understand the level of normality data for contrasted with other works of literature. The current investigation descriptive data of body depth dimension in dairy cattle was comprehensively provided in Table 2. The comparative study between current descriptive data with another researcher's findings will be elaborated on in the following passage.

Table 2. Descriptive Statistics of dairy cattle body depth and milk yields.

Traits	Min	1st quartile	Median	Mean		3rd quartile	Max
				Statistic	St. error		
NCD (cm)	28.40	37.50	38.50	38.31	0.22	39.40	45.30
CHD (cm)	57.30	66.80	69.30	69.90	0.54	73.10	84.30
BDD (cm)	63.50	71.30	75.30	75.34	0.52	78.70	88.50
UDD (cm)	-7.10	7.50	12.50	12.04	0.59	16.30	18.30
MYT (kg)	1789.00	2314.00	2538.00	2556.00	29.96	2729.00	3673.00
MYS (kg)	1985.00	2263.00	2448.00	2482.00	27.17	2646.00	3357.00
MYM (kg)	2105.00	2551.00	2764.00	2809.00	33.77	3043.00	3853.00

NCD: neck depth; CHD: chest depth; BDD: body depth; UDD: udder depth; MYT: milk yield full test day; MYS: milk yield total standardized 305d; and MYM: milk yield total mature equivalent.

The neck depth (NCD) in another paper is commonly labelled with neck width, and it has a deep span between 21 – 38 cm in dwarf cattle (BEGUM et al. 2015) and 16 – 25 cm in Korean cattle (LEE et al. 2022). The mean of this investigation's findings indicated within the standard range, but the upper limit is higher than the references. Breed differences might cause it. Afterwards, the chest depth (CHD) has a deep field of 71 – 78 cm (SIEBER et al. 1988) and 54 – 62 in Pirenaica cattle (ALTARRIBA et al. 2006). Similar situation, this trait inside the standard score and upper limit span is also greater than literature. It could be affected by the same factor as mentioned before. Next, the body depth is 72 – 82 cm (ZAVADILOVÁ et al. 2009) or 61 – 90 cm (XU et al. 2022). At the same time, the udder depth (UDD) has a reference distance of -19 to 22 cm (XU et al. 2022). BDD and UDD traits are positioned on the standard interval data because the cattle breed sample between current exploration and references are similar. Hence, it could be stated that the mean score of the recent investigation is under the area of the interval of standard data entirely.

Passingly, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) overall score was 0.50 in the current findings, meantime Bartlett's test of sphericity p-value was 0.000. Assiduously, the current exploration KMO-MSA score is described in Table 3. Considering the KMO-MSA and Bartlett's test score as indicators provided a reliance result to execute PCA.

Table 3. KMO-MSA and Bartlett's test of dairy cattle body width.

Test type		Score			
Kaiser-Meyer-Olkin factor adequacy (Overall MSA):		0.50			
MSA for each item:		NCD	CHD	BDD	UDD
		0.47	0.50	0.50	0.56
Bartlett's test of sphericity	Chi-squared:	232.55			
	df:	6			
	p-value:	0.0000			

NCD: neck depth; CHD: chest depth; BDD: body depth; and UDD: udder depth.

Following the completion of PCA, the eigenvalue, eigenvector, and loading factors became vital elements to watch scrupulously. The triumvirate of the PCA outturn was thoroughly serviced in Tables 4, 5, and 6. The Eigenvalue in Table 6 and PCA Scree-plot in Fig. 2 supplied evidence that the first principal component (PC_1), followed by PC_2, designated the most extraordinary capacity to elucidate the total variances. The PC_1 has a competency to explain the total variances of as much as 57.83%, while the PC_2 has merely 35.27%. Due to the PC_3 and PC_4 having a capability below 10%, thus they could be ignored. The PC_1 and PC_2 comprised CHD, BDD, and UDD as the loading factors, and NCD was excluded. Therefore, the NCD could be eliminated from crucial constituents of the dairy cattle body depth. However, the model of PC_1 and PC_2 could be formulated as follows:

$$PC_1 = 0.698\ log(x_2) + 0.674\ log(x_3) - 0.240\ log(x_4)$$
$$PC_2 = -0.183\ log(x_2) - 0.159\ log(x_3) - 0.965\ log(x_4)$$

which, x_2: CHD; x_3: BDD, and x_4: UDD respectively.

Comparatively speaking, the body trait of chest depth is a pivotal body measurement in culling a Holstein cow in Tunisia (SLIMENE et al. 2020). Congruently, this trait is also a vital body part in Jersey cattle concerning the survival rate of the heifer to reach the first calving period (BONCZEK et al. 1992). Meanwhile, body depth is crucial to compose the first factor of dairy strength characteristics (CHU & SHI 2002). Adjacently, the BDD is a trait that influenced the front teat placement underlying variance component estimation in Holstein cattle (DURU et al. 2012). This trait also has a payload level of the principal component in the Chinese Holstein estimated parameter genetics (OLASEGE et al. 2019). The UDD is a decisive constituent of cattle morphometrics connected to the length of productive life by principal component analysis (TERAWAKI et al. 2010). That matter is a corollary of the predisposition of the soiled mammary level linked to deeper udder based on PCA output (KLAAS et al. 2004). General references about principal component analysis outturns related to the body depth dimension avowed that CHD, BDD, and UDD are prominent features in dairy cattle and invigorate the current prevailing exploration outcome entirely. Instantly, the results of the triumvirate of body depths linked to milk yield are provided in the upcoming paragraph.

Table 4. Eigenvector principal component of dairy cattle body depth.

Traits	PC_1	PC_2	PC_3	PC_4
NCD	0.0314	0.0956	-0.9872	0.1236
CHD	0.6983	-0.1826	-0.0815	-0.6873
BDD	0.6735	-0.1595	0.0955	0.7154
UDD	-0.2402	-0.9654	-0.0981	0.0241

NCD: neck depth; CHD: chest depth; BDD: body depth; UDD: udder depth: $PC_{1\text{-}4}$: principal component the 1^{st} to the 4^{th}.

Table 5. Loading factor of the principal component of dairy cattle body depth.

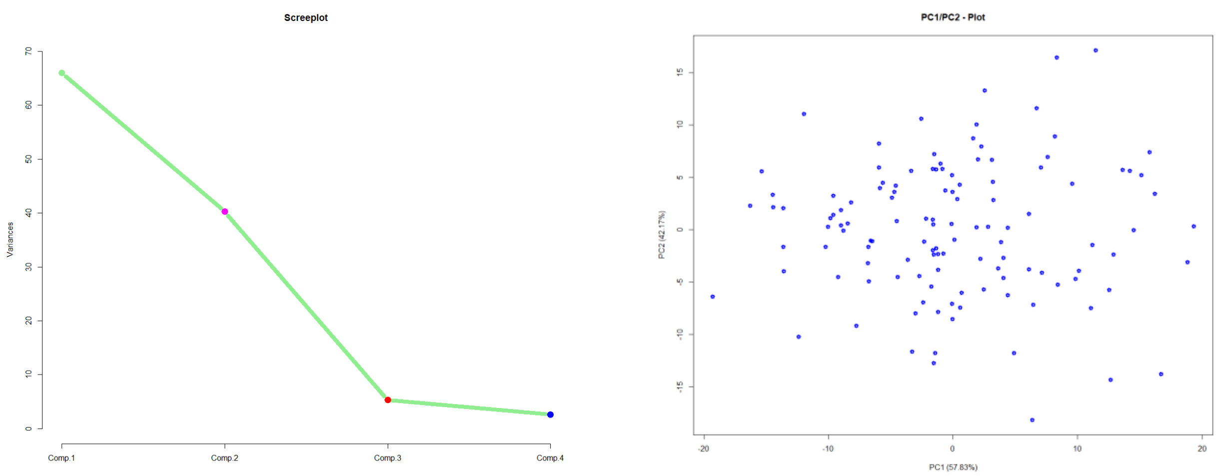
Traits	PC_1	PC_2	PC_3	PC_4
NCD			0.987	0.124
CHD	0.698	-0.183		-0.687
BDD	0.674	-0.159		0.715
UDD	-0.240	-0.965		

NCD: neck depth; CHD: chest depth; BDD: body depth; UDD: udder depth: $PC_{1\text{-}4}$: principal component the 1^{st} to the 4^{th}.

Table 6. Eigenvalue principal component of dairy cattle body depth.

Level	PC_1	PC_2	PC_3	PC_4
Standard deviation	8.1237	6.3448	2.2985	1.6096
Proportion of variance	0.5783	0.3527	0.0463	0.0227
Cumulative proportion	0.5783	0.9310	0.9773	1.0000

$PC_{1\text{-}4}$: principal component the 1^{st} to the 4^{th}.



(a) (b)

Figure 2. Dairy cattle body depth. (a) Scree-plot, and (b) PC_1/PC_2-plot.

From now on, the level of the phenotypic interrelationship between body depth dimension and interconnection to milk yield is explicitly displayed in Table 7. The coefficient regression model and their faculty were also presented in Table 8. The data in Table 7 signified that the UDD has the highest correlation to milk yield characteristics but negatively. This status happened due to the measurement starting point on the horizontal imaginer line of the hock. In the position of the udder baseline on the upper area of the imaginer line of the hock, then the score was positive, but the milk yield decreased because the udder capacity was more petite. So, the interrelationship was constantly adverse. As well as on the vice versa set-up of udder depth. Meanwhile, the most significant correlation level between linear type traits was possessed within CHD and BDD. Attractively, the triplet of body depth traits was given statistical affirmation that strong significant correlated to milk yield. This proof indicated the importance of the body depth dimension in dairy cattle performances.

Parenthetically, the linear equation of body depth linear type traits to the milk yields test-day (MYT) potency was delivered as follows.

$$\mathrm{MYT_{1st}} = 2862.590 - 25.496(x_4)$$
$$\mathrm{MYT_{2nd}} = 1919.063 - 24.221(x_4) + 13.279(x_2)$$

meanwhile, to milk yield standardized 305-d (MYS), follow this equation

$$\mathrm{MYS_{1st}} = 2772.520 - 24.125(x_4)$$
$$\mathrm{MYS_{2nd}} = 1658.680 - 22.619(x_4) + 15.676(x_2)$$

Moreover, eventually, the milk yield of mature equivalent (MYM) is stated as follows.

$$\mathrm{MYM_{1st}} = 3061.172 - 20.921(x_4)$$
$$\mathrm{MYM_{2nd}} = 1905.004 - 19.358(x_4) + 16.271(x_2)$$

While $\mathrm{MYT_{1st}}$ is the simple linear model of the total milk yield test day, $\mathrm{MYT_{2nd}}$ is the multiple linear model of the total milk yield test day. Meanwhile, $\mathrm{MYS_{1st}}$ is the simple linear model of the total milk yield standardized 305-d; $\mathrm{MYS_{2nd}}$: is the multiple linear model of the total milk yield standardized 305-d. Then, the $\mathrm{MYM_{1st}}$ is the simple linear model of the total milk yield of mature equivalent; $\mathrm{MYM_{2nd}}$ is the multiple linear model of the total milk yield of mature equivalent. Eventually, the x_2: CHD; and x_4: DUD, respectively. Then, the session continued by criticizing all the body depths dimension dexterity associated with the milk yield.

Table 7. Phenotypic correlation matrix of dairy cattle body depth to milk yields.

Corr.	NCD	CHD	BDD	UDD	MYT	MYS	MYM
NCD	1.000						
CHD	0.068	1.000					
BDD	0.038	0.921*	1.000				
UDD	-0.242*	-0.105	-0.123	1.000			
MYT	0.139	0.288*	0.293*	-0.500*	1.000		
MYS	0.108	0.362*	0.362*	-0.521*	0.903*	1.000	
MYM	0.081	0.295*	0.249*	-0.364*	0.733*	0.851*	1.000

NCD: neck depth; CHD: chest depth; BDD: body depth; UDD: udder depth; MYT: milk yield full test day; MYS: milk yield total standardized 305d; and MYM: milk yield total mature equivalent.
* Correlation is significant at the 0.01 level (2-tailed).

Begin with the neck depth trait as a topic to discuss. The neck region in dairy cattle is generally related to the barn facilities study significantly to minimize the risk of odd lesion ratio (KIELLAND et al. 2010). This trait is also linked with a cow's body condition score (BCS) due to a dry period and heavier fat deposition in this area (PRUITT & MOMONT 1987). Therefore, the milk yield capacity does not directly influence the NCD. It was linearly with the current findings that this trait disqualified as a crucial component of body depth dimension in dairy cattle and insignificantly connected with the milk yield capacity. Although, a study declared that a thin, slender neck section signified a milk characteristic or dairy form (BANERJEE et al. 2014).

It is continued with the chest depth (CHD) to discuss in detail. Holstein cow's chest depth is more profound than other cattle breeds (McGEE et al. 2007). This trait strongly correlates with the live weight of various ages and breeds of cattle (ÖZLÜTÜRK et al. 2006); (OZKAYA & BOZKURT 2009, ALTARRIBA et al. 2006). In addition, CHD is also positively linked with BCS and heart girth (LE COZLER et al. 2019b). The higher the parity number, the deeper this region, mainly in the first lactation period (XAVIER et al. 2022). Then, a deeper cavity in this area leverages the broader level in the pleural cavity; consequently, lung expansion is easier (GELAYE et al. 2022). Henceforth, a profound chest area indicates greater milk yield potency (SIEBER et al. 1988, MARTYNOVA & ISUPOVA 2019). It was parallelly to the present investigation that CHD had a significant relationship with the milk yield and was categorized as a decisive trait in the body depth dimension of dairy cattle. Again, the heritability score of this trait is classified as high (KHAN & KHAN 2016). A contra contrivance unveils that this trait is adversely interconnected with milk yield capacity (BLACKMORE et al. 1958). Thus, a study claimed that a shallower chest is preferred concerning milk yield capacity (KASSUMMA 1981).

Table 8. The regression coefficient of body depth to milk yields.

Model		Milk yield-$_{\text{tim}}$ (MYT)		Milk yield-$_{\text{standardized 305d}}$ (MYS)		Milk yield-$_{\text{mature equivalent}}$ (MYM)	
		β	Adjusted R square	β	Adjusted R square	β	Adjusted R square
1	Intercept	2862.590	0.243*	2772.520	0.266*	3061.172	0.125*
	UDD	-25.496		-24.125		-20.921	
2	Intercept	1919.063		1658.680		1905.004	
	UDD	-24.221	0.294*	-22.619	0.357*	-19.358	0.185*
	CHD	13.279		15.676		16.271	

CHD: chest depth; BDD: body depth; UDD: udder depth. *p-value < 0.01.

Discussion proceeded to the body depth (BDD). This trait is strongly positively correlated with the body strength characteristic (ALIMZHANOVA et al. 2018), thus highly linked with body weight (GRUBER et al. 2018). Profound body depth is indicated a more excellent body condition score (BCS) (BERRY & EVANS 2022). The BDD is significantly different among the period of the calf, weaning, and one year of age in various breeds of cattle (BERNARD & HİDİROGLOU 1968). Nonetheless, it was uncorrelated with longevity (VACEK et al. 2006); instead, it has a relatively higher risk of being culled (ROSTELLATO et al. 2021) because of the genetic correlation negatively with longevity (ZAVADILOVÁ et al. 2009). The heritability score of this trait is as big as 0.37 (BERRY et al. 2004) and 0.36 (DEGROOT et al. 2002). The BDD score increased symphonically with the dairy-oriented breed (KOENEN & GROEN 1998). Moreover, the body depth affects the dry matter intake (DMI), and henceforward it will influence the milk yield and fat milk yield (VEERKAMP 1998, BAIMUKANOV et al. 2022). Due to this, the body depth correlates with the milk production characteristics as much as 0.138-0.228 (SCHMIDTMANN et al. 2023). The magnitude of objective evidence was sturdily directed to the eminence of this trait linked to the milk yield characteristic. The current study strengthened the previous claim based on PCA output and correlation regression analysis.

Lastly, the udder depth (UDD) would be exposed broadly. The level of the UDD is affected by the firmness of the rear-to-front suspensory ligament, and it has a potential response to the milk yield characteristic (SHANKS & SPAHR 1982). Accordingly, the milking ability is associated with the level of udder depth in dairy cattle (GALLUZZO et al. 2022). The milk constituents are also influenced by this trait, mainly the pregnancy-associated glycoprotein (PGA) underlying genomic breeding value (GEBV) (SANTOS et al. 2018) and lactose percentage (MIGLIOR et al. 2007). Therefore, United Stated categorizes this trait as the cow performance index (COLE et al. 2021). However, the udder depth significantly correlates with the udder health status, notably mastitis (SINGH et al. 2014) and somatic cell count (ROGERS 1993). Consequently, a low rear udder attachment is reported to be negatively linked with longevity (BOUŠKA et al. 2006, VACEK et al. 2006). Udder depth with milk-corrected longevity has a positive genetic correlation of as much as 0.28, while longevity only has a negative genetic correlation of 0.02 (ZAVADILOVÁ et al. 2009). Once more, the udder depth had significant relationships with true longevity (TL) and functional longevity (FL) (ROSTELLATO et al. 2021). Ultimately, the magnitude of scientific proof declared that the leading association of this trait to milk yield capacity is aligned with the present journey records.

CONCLUSION

As a closure, the chest depth (CHD), body depth (BDD), and udder depth (UDD) are the imperative traits in the depth dimension of dairy cattle. Meanwhile, in association with the milk yield characteristics delegated, the UDD trait is the greatest. Both CHD and BDD were significantly linked to milk yield, but the enormity of kinds of literature is inclined to the BDD trait. Therefore, the BDD has been voted the second crucial body depth dimension in dairy cattle. Eventually, it is recommended that the UDD trait as a main priority in the lactation cow selection scheme. Due to the calves and heifer period, the udder area has yet to grow, and then the BDD trait might be helpful as the initial priority for the selection program in that period. However, it should be affirmed with more supporting data.

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