

## An investigation on morphometric measurements and adaptability of Marathwadi buffaloes in the native breeding tract

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**Abstract:** The present study was carried out on 204 Marathwadi buffaloes, 154 from Livestock Farm Complex (LFC), College of Veterinary and Animal Sciences (COVAS), Udgir, Dist. Latur and 50 from villages of Udgir tahsil to analyse their growth and adaptability profile. Marathwadi buffaloes were divided (age wise) into three groups (0-1 year, 1-3 year and 3 year and above). Different biometrical and physiological parameters were recorded during five consecutive years to study the growth profile and adaptability of Marathwadi buffaloes. No significant difference was observed in morphological parameters (body length, chest girth, height at withers, body weight and body surface area) between buffaloes reared in LFC, COVAS, Udgir and under field conditions of adjoining villages in Udgir Tahsil. Body growth pattern was proportionate according to age in both the groups. However, growth parameters were comparatively lower in buffaloes under village conditions than buffaloes maintained at LFC, COVAS, Udgir. Benzra's Coefficient of Adaptability (BCA) was used to assess the adaptability of these buffaloes and no significant difference was observed among the both group of buffaloes across all age groups. However, as per Iberia Heat Tolerance Coefficient (IHTC), adaptability values were nearby 100 in all groups and there was no significant difference was

observed between these two groups. It is inferred that, growth pattern was proportionate with age in Marathwadi buffaloes which were reared under organised farm as compared to the animals reared under field condition.

**Keywords:** Adaptability, Growth profile, Marathwadi buffaloes

Adaptation is often at the expense of performance, and survivability is often better in "low" performance animals because their input needs (especially feed) and internal heat production are not as great (Gaughan and Smith, 2017). Marathwadi buffalo is an indigenous breed of buffalo which is distributed in Marathwada region viz. Nanded, Parbhani, Dharashiv and Latur districts of Maharashtra state. This buffalo breed is well survived in this region and thrive mainly on agricultural crop residues feeding and to rear this buffalo require less external inputs as reported earlier by Bande et al. (2018) and therefore, farmers of this region mostly prefer Marathwadi buffalo as milch buffalo. Light to medium body built, predominantly black colour, long flat horns, 3.5–4.0 litter daily average milk production and regular breeder are some productive and reproductive characteristics of Marathwadi breed of buffalo (Joshi, 2010). Farm animals body growth and production performance are generally dependents on their genetic constituents, nutrition pattern, health status and routine management practices. Periodic assessment of growth profile is essential to judge physiological, metabolic and health status of farm animals for modification in management practices for slow growing animals. Farm animal's biometrical measurements and physiological profiles are different in different breeds of similar species and therefore, standard baseline data is required to assess their productivity in different geographical locations. Different breeds of indigenous buffalo are adapted in their origin with optimum productivity however; body growth profile and adaptability studies are most important criterion to assess nutritional, reproductive and productive status in their breeding tract. Best of our knowledge, very scattered and limited data is available on Marathwadi buffalo growth profile and adaptability studies and hence, it was planned to analysed growth profile and adaptability of Marathwadi buffalo.

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**Table 1** Age-wise comparison of morphometric measurements and adaptability parameter of Marathwadi buffaloes

Parameters	Buffaloes groups	Age (years)			Student's Unpaired t-test
		0-1	1-3	3 and above	
Body length (cm)	COVAS, Udgir	76.4±1.0	95.6±2.2	140.66±3.3	NS
	Nearby Villages	72.0±1.0	93.9±2.6	124.9±1.9	
Chest girth (cm)	COVAS, Udgir	96±1.4	127±3.3	179.4±1.9	NS
	Nearby Villages	84.0±1.6	117.5±4.0	171.6±1.6	
Height at withers (cm)	COVAS, Udgir	84.4±1.6	98.6±2.1	135.2±2.2	NS
	Nearby Villages	76.0±1.1	97.0±3.6	124.1±1.3	
Body weight (kg)	COVAS, Udgir	63.5±2.7	146.0±4.7	392.7±4.4	NS
	Nearby Villages	59.4±1.1	142.9±2.4	314.0±2.8	
Body surface area (m <sup>2</sup> )	COVAS, Udgir	1.4±0.0	2.4±0.1	4.3±0.0	NS
	Nearby Villages	1.4±0.0	2.4±0.0	3.8±0.0	
BCA values	COVAS, Udgir	1.3±0.0	1.2±0.0	1.1±0.0	NS
	Nearby Villages	1.6±0.0	1.5±0.0	1.4±0.0	
IHTC values	COVAS, Udgir	103.1±0.7	100.0±0.7	96.6±0.9	NS
	Nearby Villages	111.0±0.9	106.4±0.7	103.8±0.5	

(Note: NS= Non-Significant different between two groups)

The present study was carried out on a total of 204 Marathwadi buffaloes, 154 from Livestock Farm Complex, College of Veterinary and Animal Sciences Udgir, Dist. Latur (Maharashtra) and 50 Marathwadi buffaloes from nearby villages were selected for this study. Selected buffaloes of both the groups were divided accordingly age wise into 0-1 year, 1-3 year and 3 year and above and study was conducted during five consecutive years which was started in year 2016-17 and completed in year 2020-21. Biometrical measurements such as body length (cm), chest girth (cm), height at withers (cm), body weight (kg) and body surface area (m<sup>2</sup>) were estimated by routine methods and analysed growth profile of buffaloes. Buffalo body surface area (BCA) was calculated by Brody S. (1945) equation and physiological responses (respiration rate, pulse rate and rectal temperature) of each buffalo were recorded thrice in a year during study. The average values of physiological responses were used to determine adaptability by two methods i.e. Benezra's Coefficient of Adaptability (BCA) (Benezra, 1954) and Iberia Heat Tolerance Coefficient (IHTC) (Rhoad, 1944). Data was statistically analysed by using t test (Snedecor and Cochran, 1994) and mean values and standard errors were calculated and presented in tables.

Body length, chest girth, height at withers, body weight and body surface area of Marathwadi buffaloes were proportionate with increasing age in both the groups of buffaloes. No significant difference was observed in morphological parameters between LFC, COVAS, Udgir and village reared buffaloes. However, it was noticed that the values of different parameters of village reared buffaloes were numerically lower than the buffaloes reared at LFC, COVAS, Udgir (Table 1). Growth rate of growing Marathwadi buffaloes (0-3 years) was slower as compared with Murrah buffaloes (Mishra et al. 2015). However, with the increasing age of Marathwadi buffalo (3 year and above), body length, chest girth, height at withers, body weight and body surface area were

proportionately increased in both the groups which is in accordance with the findings of Joshi (2010). Our findings indicated that, body growth profile of Marathwadi buffaloes which were maintained at LFC, COVAS, Udgir were better than buffaloes reared by farmers in nearby villages. Therefore, additional managerial practices such as proper shelter, feeding and watering should be followed during summer season by farmers for achieving standard growth and optimum production from Marathwadi buffaloes in their breeding tract. Adaptability coefficient of farm animals were estimated by recording physiological responses (respiration rate and rectal temperature) and calculated values as 2 and 100 are considered as ideal value for BCA (Benezra, 1954) and IHTC method (Rhoad, 1944), respectively. As per the BCA, Marathwadi buffaloes of all age groups that maintained by farmers and LFC, COVAS, Udgir were adapted (Table 1) where, BCA values were less than 2 however, slight numerical difference was observed in BCA values between LFC, COVAS, Udgir and villages reared buffaloes. It was indicated that there was better managerial practices followed for Marathwadi buffaloes which were maintained at LFC, COVAS, Udgir compared with buffaloes reared by farmers in nearby villages. Adaptability coefficient values calculated by IHTC were nearer to 100 in both buffalo groups (Table 1) with little difference in between groups and it was observed that, buffalo which were maintained at LFC, COVAS, Udgir were adapted well as compared with village reared buffalo.

The Iberia Heat Tolerance Coefficient (IHTC) values for village reared buffaloes were lightly more than 100 (Table 1) which showed that, these buffaloes were comparatively less adapted as compared with buffaloes which were reared at LFC, COVAS, Udgir. BCA method is based on respiration rate and rectal temperature and whenever, there is increased in surrounding environmental temperature, animals respiration rate is being

increased and heat quickly dissipated from the animals. Therefore, adaptability coefficient that determined by BCA method is might be less than 2 in all buffalo groups. However, adaptability values calculated by IHTC method were nearer to 100 in all groups and there was no significant difference was observed between village and LFC, COVAS, Udgir reared buffalo groups, Our findings are in accordance with Vaidya et al. (2022) they observed IHTC in 3 years and above age groups in of Marathwadi buffaloes which showed better adaptability compared to the age groups 0-1 year and 1-3 years, It indicates that the adaptability of the Marathwadi buffalo to the harsh climate of Marathwada increased with an increased in the age. BCA and IHTC are heat tolerance indices for farm animals that based on physiological indices (respiration rate and rectal temperature) and values of these physiological indices increase with increase in environmental temperature and adaptability values may be slightly alter. Therefore, proper thermal protective measures are required for Marathwadi buffaloes (Kalyankar et al. 2004) which are reared by farmers in nearby villages to enhance their reproductive and productive performances in their breeding tract.

### Conclusions

The body growth pattern of Marathwadi buffaloes reared under field and organised farm were proportionate with age. However, for better adaptability, thermo-protective care should be taken by farmers during adverse climatic conditions to sustain productivity. Marathwadi buffaloes were well adapted in their native breeding tract as per Benezra's Coefficient of Adaptability (BCA) and Iberia Heat Tolerance Coefficient (IHTC) with no significant difference between buffaloes reared under field condition and organised farm.

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