
Evaluation of different visual image analysis methods to estimate of body measurements in cattle

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Body measurements of the animal using for evaluation of individual identification, structural capacity, relationship with yield levels, morphological type and determination of breed characteristics. In generally this measures obtaining by traditional tools. Difficulties on holding some big animals like water buffaloes and cows or half domestic and wild animals may cause some mistakes on collecting and evaluating data. Many researchers specified that using of traditional tools for measuring these kind of animals carry out suspicious results. By the developing computer based technology, using of Visual Image Analysis technology gained in animal science especially for estimating of body measurements and live weight, quality of products etc. The possibilities of use, working principles, advantage and disadvantage of methods which used for estimating of body measurements in cattle by Visual Image Analysis evaluated with the literatures in this study. The researches showed that Visual Image Analysis method absolutely can be use for estimating of body measurements in cattle and other species.

Key words: *Morphometric parameters, Animal breeding, Visual Image Analysis, laser telemeter, laser pointer.*

Morphometric parameters are used for a most important selection criteria in animal breeding. Body measurements of the animal can use for evaluation of individual identification, structural capacity, relationship with yield levels, morphological type and determination of breed characteristics. Also, these measurements have moderate and high heritable (Tien and Tripathi, 1990; Velea *et al.*, 1991). These characteristics give idea about growth levels of animals. Hence it can be use for culling which animal do not reach wanted levels in wanted time periods.

Summary

Introduction

Desired of improvement in animal breeding by morphologic evaluation; the method which using for measure and evaluation of morphologic characters must be practical, fast, objective and comparable also used perfect technology and data processing.

In many researches about determination of body measurements of animals; Lydtin's Stick, Duerst's goniometer and tape measure have been used as a measure tools (Figure 1) (Nilipour and Butcher, 1997). But many researchers specified that using of traditional tools for measuring semi domestic and wild animal as cattle and water buffaloes, carry out suspicious results (Soysal and Kok, 1997; Sekerden and Tapki, 2003).

Digital image analysis and image processing have been used for mainly for determination of morphometric parameters, evaluation and classification of the products in animal science (Mc Donald and Chen, 1990; Gerrard *et al.*, 1996; Li *et al.*, 1997; Cebeci and Bek, 1994; Van der Sluis, 1991).

Many researchers have used to both traditional and digital image process method for estimating of body measures in Holstein and crossbreeds of Holstein and other cattle breed and have described that digital image processing is more suitable, exceptional, fast and economical method (Ozder *et al.*, 2007; Barbera, 1990; Balestra *et al.*, 1994; Negretti *et al.*, 1997; Barbera *et al.*, 1995).

Patterson (1990); Zehender (1996); Pargas *et al.*, (1997) and Trenkle and Liams, (1999) have been used digital image processing method for animal morphometric evaluation and specified this method give possibilities to measuring of animal confirmation; objective, fast and exceptional.

The differences between Visual Image Analysis methods in generally by changing of reference point. Four different methods for Visual Image Analysis were evaluated in this study.

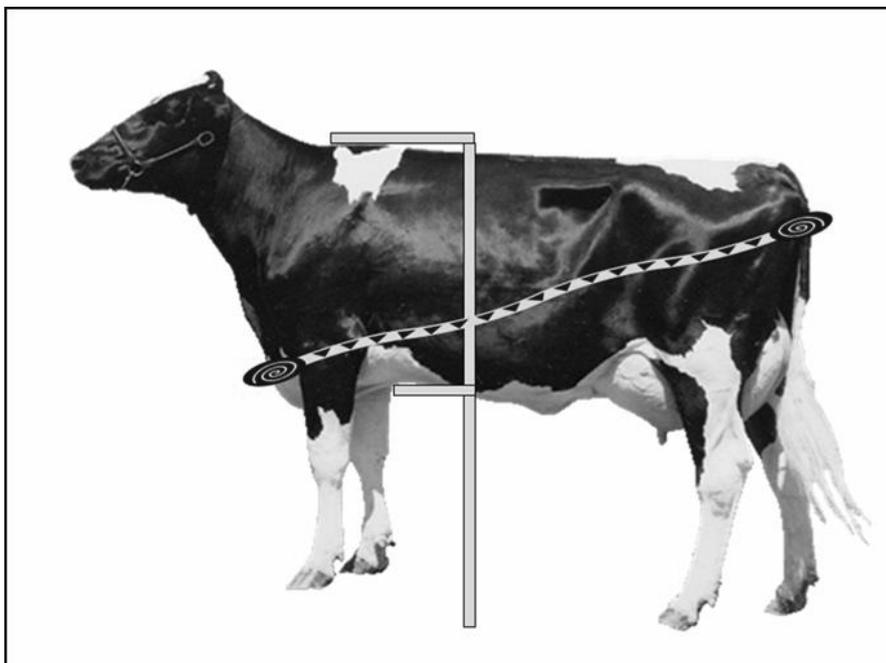


Figure 1. Measuring by traditional tools.

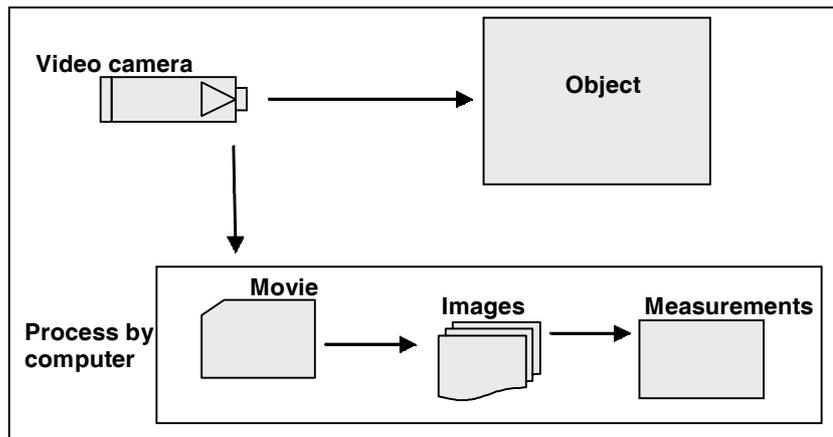


Figure 2. Details of recording scene

The recording is in same procedures for all methods (Figure 2). The visual images getting by video camera and transfer to computer. The digital images captured from movie by an image process software. Body measurements obtaining from images by using of reference points on body surface.

Four different methods has been detailed with their advantage and disadvantage on the below.

A scale which has 20 centimeters diameter and divided per centimeter by colors has been put on body of animals with a view to reference points to help for determinate real measures by computer (Figure 3). This method can be used for domestic herd mostly. Due to the scale should be on surface of animal in this method, it could not be successful for measuring animal as semi-domestic and wild animals.

A constant object which is in the same line or as near as the body surface of animal can use as a reference points. Almost the real measurements of the object must be known before. For example banister of cage or any constant object in way where animal to pass (Figure 4). For successfully working of this method animals must be in free stall, cage or animal should pass in gate when recording done, otherwise it could not be obtaining a reference point on image. Due to working of this method is not successfully for semi-domestic and wild animals.

The distance between focus of camera and animal is obtaining by the laserteleometer in this method (Figure 5). Inconvenience of this method is calibration is changing for each camera. Cause of that spatial calibration should be make for which camera will use in record before recording. The most important advantage of this method is give possibilities to obtaining of body measurements of semi-domestic and wild animals or animals in pasture.

Methods and differences

Method 1. Using of a constant scale as a reference point

Method 2. Using of constant object as a reference point

Method 3. Using of laserteleometer as a reference point

Method 4. Using of the laser pointers as a reference points

Two laser pointers fitted as parallel to the video camera. Distance between two laser pointer must be fixed for example at 35 cm. The distance between two laser pointers should be calibrate in leave point from laser pointers and arrive point as the surface of the animal. Laser wavelength and power were must be chosen in standard ranges for animal rights which described in international rules (Figure 6). The advantages of this method are also similar as a described in *Method 3*. The Inconvenience of this method, diameters of light points changes as larger than leave point by the distance. Due to by long distances resolution of light points decrease.

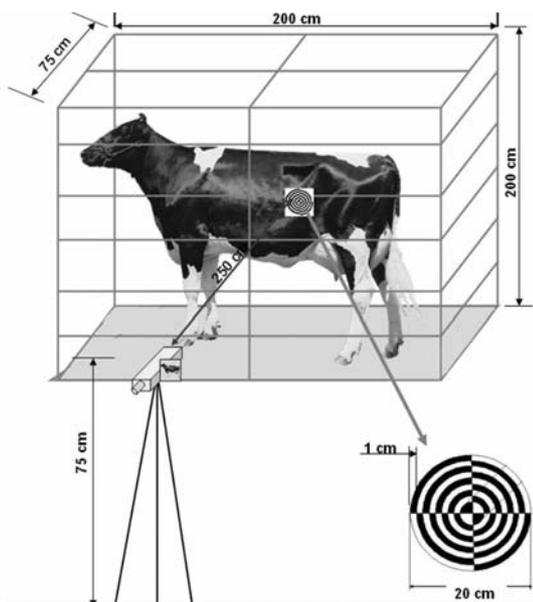


Figure 3. Using of a constant scale as a reference point.

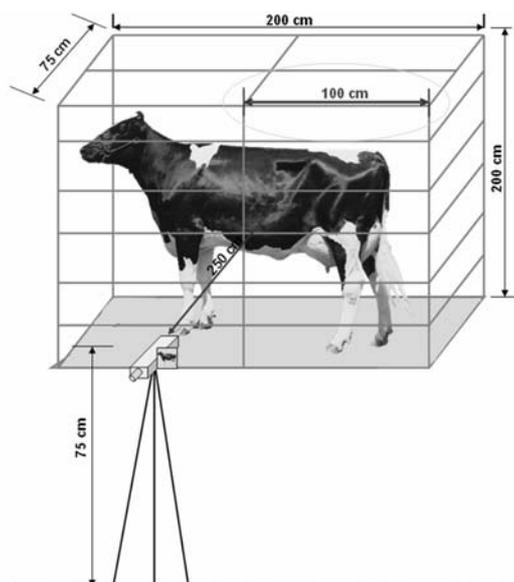


Figure 4. Using of constant object as a reference point.

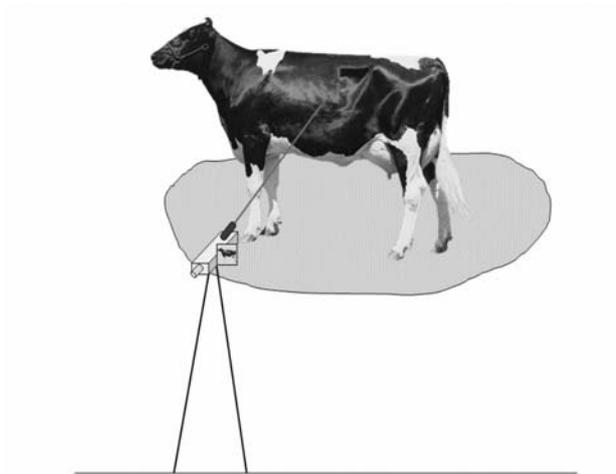


Figure 5. Using of laser telemeter as a reference point.

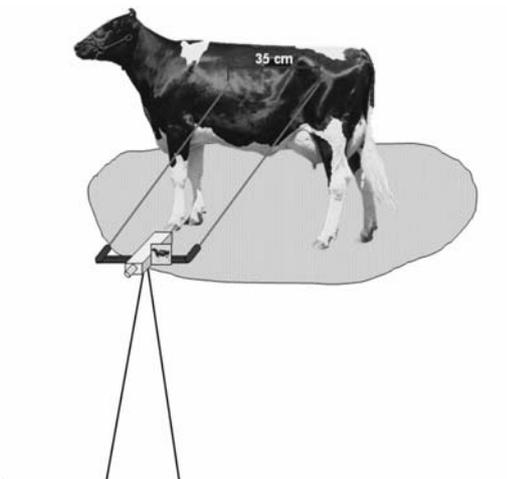


Figure 6. Using of the laser pointers as a reference points.

The possibilities of using Visual Image Analysis, methods and their differences explained in this study. Each method have advantages and disadvantage to each another. The researches showed that Visual Image Analysis method absolutely can be use for estimating of body measurements in cattle and other species. Also using of the Visual Image Analysis is most practical, fast, and give objective and comparable results.

Results

List of references

- Barbera, S.** 1990. Ann.Fac.Sci.Agr.Univ. Torino Vol.XVI: 101.
- Cebeci, Z. and Y. Bek.** 1994. Yapagi örneklerinin Kalite Kontrolünde Görüntü Isleme Sistemi Kullanimi Üzerine Bir Arastirma. Tarimda Bilgisayar Uygulamalari Sempozyumu 5-7 Ekim 1994. E.Ü.Ziraat Fakültesi-Izmir. S: 1-7.
- Gerrard, D.E., Gao, X. and Tan, J.** 1996. Beef marbling and colour score determination by image processing. J.of Food Sci., 61(1): 145-148.
- McDonald, T. and Chen, Y.R.** 1990. Separating connected muscle tissues in images of beef carcass rib eyes. Transcations of the ASAE, 33(6): 2059-2065.
- Nilipour, A.H. and Butcher, C.D.** 1997. Data collection is important in poultry integrations. Misset World Poultry, 13 (8): 19-20.
- Ozder, M., Dogaroglu, O.K., Tuna, Y.T. and Onal, A.R.** 2007. Utilizing Possibility Of Image Process Technology On The Estimation Of Live Weight And Various Body Measurements Of Slaughtery Cattles. 3rd Joint Meeting of the Network of Universities and Research Institutions of Animal Science of the South Eastern European Countries, Thessaloniki 10-12 February 2007.
- Sekerden, O. and I.Tapki.** 2003. Hatay Ili Anadolu Mandalarinin Köy sartlarinda Büyüme Özellikleri. A. Ü. Ziraat Fakültesi Dergisi. 2003-Erzurum. S: 51-55. Cilt 34, Sayi: 1.
- Soysal, M.I. and S. Kök.** 1997. Bazi Vücut Ölçülerine göre Çesitli Ergin Manda Populasyonlari Arasi Genetik Uzakliklarin Tesbiti. Trakya Bölgesi II.Hayvancilik Sempozyumu. 9-10 Ocak 1997 - Tekirdag S: 103-109.
- Tien, N.Q. and Tripathi, V.N.** 1990. Genetic Parameters of body weight at different ages and first lactation traits in Murrah buffalo heifers. Indian Vet. J., 67(9): 821-825
- Trenkle, A. and C.Liams.** 1999. Use of a Digital Camera to Collect Carcass Data from Experimental Cattle. Beef Research Report-Iowa State University.
- Van der Sluis, W.** 1991. A camera and PC can now replace the quality inspector. Misset World Poultry, 7 (10): 29.
- Velea, C., Bud, I., Muresan, G., David, V., Vomir, M., Cristea, C. and Elisei, L.** 1991. The main milk traits of Romanian buffaloes breed. In Proceedings, Third World Buffalo Congress, Varna, Bulgaria, May 1991, Vol: II, Sofia, Bulgaria, Agric. Academy, 494-499.