Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.3, No.2, 2013

Goat Weights Obtained From Innovated and Two Other Scales Prior to Experimental Trypanosome Infection

NONGO, N.N.[1] AKINBOADE, O.A.[2]
1. Department of Veterinary Parasitology and Entomology,University of Agriculture, Makurdi,Nigeria.P.M.B 2373, Makurdi,Tel: +234-7068010038.
2. Department of Veterinary Microbiology and Parasitology, University of Ibadan, Nigeria. Tel: +234-8033241106.
E-mail of the corresponding author: drnongo@yahoo.com

Abstract
In generating base line weights from quarantined goats intended for an experimental trypanosome infection, two existing types of scales were compared to a third type which was innovated to enhance holding of animal and minimise stressfulness usually involved in the weighing process.

The aim of using the three scales concurrently was to find comparability of the innovated or improvised scale to the step-on and hook scales during the pre-infection period in order to justify its subsequent use or discontinuance during the infection period when the animals were exposed to the stress of infection.

Weights obtained from the three scales were comparable (improvised scale = 13.94 ± 0.12^{b}, step-on scale = 13.76 ± 0.11^{b}, hook scale = 14.33 ± 0.17^{a}). However, analysis of variance showed significantly higher ($p < 0.05$) weights and greater standard deviation in measurements on the hook scale than the other two types of scale which had greater concurrence between them. It was concluded that either improvised scale or step-on scale could be used as a more accurate weighing device in preference to the hook scale.
Keywords: Goat, Comparative weights, Weighing scale, Innovation, Trypanosome infection.

1.0 Introduction

Determination of weights in routine Livestock Management assists in tasks like assessment of animal's performance, the quantity of feed or medication to be administered etc. The most used, easiest and least accurate method of Weight determination is Visual estimation frequently done when weighing device is not available or its use not practical (McNitt, 1983). In experiments however, there is need to obtain consistent data requisite to quality assurance and 'test-re-test reliability' which seeks to ensure that observed change is not attributable to unreliable measuring instrument (Ogundipe et. al. 2005). Where data on weights is required, the importance of a good weighing scale can therefore not be overemphasised. The type of weighing device used dictates the degree of physical exertion that would be involved in the weighing operation and therefore the stressfulness on animal and handler, for instance, pigs and small ruminants are often weighed in a cage suspended from a spring balance(McNitt, 1983). Another common practice in many animal clinics within the tropics consists in finding the difference in Weight of attendant taken from a step-on scale with and without holding the animal. This is necessarily associated with struggling and fatigue where many animals are involved. In particular, when agile animals such as goats are weighed by such methods, holding the animal, its struggling on being lifted up and down could become an important associated stress. Such stress can mask performance where subsequent infection with trypanosomosis is anticipated since affected animal is intolerant to stress (Abebe, 1991). The stress influences the infection (ILRAD, 1989) that has anaemia as a principal feature where it is known that goats could withstand PCV as low as 9% if they are not stressed by handling (Matthews, 1999). Influence of the trypanosome infection as a factor on weight of the subject is usually very substantial. Invasion of the organisms and Leucocytes into brain parenchyma triggers loss of weight and even death (Agbo et. al. 2002). Equally, release of cytokines like tumor necrosis factor-alpha(TNF-α)during the infection exerts a role in control of body weight (Argiles et. al. 1997). Measurement of weight by a method which is less stressful to the animal is therefore desirable as it would not confound impact of the disease on weight changes and would permit more accurate assessment of primary pathological process. The objective of this work was to bring innovation on a weighing device where animal being weighed appeared obviously comfortable, less stressed, without compromising the accuracy of the weighing scale, so that repeated handling does not confound subsequent infection.

2.0 Measurement of Weight in Assessment of Body Condition

In trypanosome infection, diagnosis within endemic areas utilises clinical signs which include loss of body condition through emanciation. (Anosa 1991, Rabo and Oyejide 1996, Kahn and Scott 2010).

Generally, body condition score in small ruminants like goat is taken as an average of the lumbar and sternal scores, each based on score of 0 – 5 which is done by visualization and palpation to feel bony part through skin and underlying tissues such as fats. Animals are then graded as emanciated, lean, obese etc. depending on how palpable the bony parts are and how smooth or rounded the body appear. But regular weighing is the most accurate way of monitoring condition (Matthews, 1999).

3.0 Materials and Methods

3.1 The Animals

Male goats of the West African Dwarf and Red Sokoto (Maradi) breeds were obtained from markets in and around Makurdi in Benue state for conduct of the experimental work. Visual estimation was used to obtain animals of a particular size that would fall within a close range of weight after acclimatization. By their dentition, these animals were between one to two years old. It was intended that after quarantine, the animals eventually continuing in the experiment would be blocked by weight through selection of those whose weights only varied within a narrow limit while discarding those outside the range.

3.2 The Scales

a) Hook scale was from Pocket Balance made in Germany. It had a graduation of 0.5kg on its interval.
b) Step-on scale was from Harson, the Emperor brand, made in China. It had graduation of 0.1kg on its interval.
c) Innovated (improvised) scale was based on Hana scale having a mono pedal rest, 0.2kg interval on its clock-type graduated face below a pan screwed onto the top for use originally as a meat scale.

3.2.1 Innovation Process

Adjustment by disarticulation of this meat type scale through unscrewing the small pan on top which could not carry a goat was followed by articulating the remaining unit to a metal trolley (Fig. 1.0, Plate 1.0, Plate 4.0). It was screwed onto a wooden plank on which animal stood to be weighed. A perimetric cage was constructed by welding iron rods while hinged door made of same material admitting the animal could open and close.

The clock scale now hanging below could be read easily. By adjusting screw it read zero to which it returned after weighing an animal. When brought to the scale a goat jumped in on opening the door.

Wheels fitted on the quadripedal trolley forming base of the scale made it possible to be pushed around a unit on concrete floor.

3.3 Data Analysis

Data obtained on weights was subjected to analysis of variance (ANOVA) ($\rho < 0.05$) and separation of mean by Duncan's multiple range test.

4.0 Result

Table 1.0 **Pre-infection Weight table**

	Treatment (Mean ± SE)		
Day	**Improvised**	**Step-on**	**Hook**
1	13.88 ± 0.21^{a}	13.66 ± 0.19^{a}	14.13 ± 0.40^{a}
3	13.93 ± 0.22^{b}	13.70 ± 0.17^{b}	14.52 ± 0.22^{a}
5	14.01 ± 0.23^{a}	13.93 ± 0.21^{a}	14.33 ± 0.21^{a}
Total	13.94 ± 0.12^{b}	13.76 ± 0.11^{b}	14.33 ± 0.17^{a}

Note: Mean ± SE across a row with different superscripts are significantly different with a>b>c>d. Mean separation done with Duncan Multiple Range test

4.1 Discussion

Weights of uninfected quarantined goats generated by the three measuring scales used in this work were comparable. However, there were apparent differences between the methods in terms of level of struggling by animals and ease of handling by persons involved in the exercise. The result showed greater concurrence between weights obtained from the improvised and step – on scale than that from the hook scale. It had been recommended previously that goats be weighed either by a weigh band, a spring balance (such as the hook scale) or the platform scale usually designed for sheep which has a holding cage and clock scale on top (Steele, 1996). The improvised and step – on scales showing greater concurrence in their measurements in this experiment are both platform type scales. They have improved readability with graduations of 200 g and 100 g respectively, unlike the hook scale which is a spring balance type scale having graduation of 500 g .

Repeated measurements of live weights done through daily, weekly or forth nightly weighing exercises had been commonly undertaken in previous experiments where goats were infected with trypanosomes. Adah et. al., (1993) reported that T. congolense infected Red Sokoto goats (RSG) showed negative mean weight gain from 4 days post infection until death at 11 days while similarly infected West African Dwarf (WAD) goats had negative weight gain up to day 7 without deaths but control goats recorded positive weight gains. In yet another experimental infection with *Trypanosoma congolense* involving WAD goats and their crosses with Sahelian breads, there was no significant difference in tolerance between the breeds but weight loss tended to be non-significantly ($P>0.05$) greater in the crossbreeds than WAD goats (Faye et.al. 2002).. Variation in weighing methods used or experimental conditions or both could be responsible for such differences in the observations raised above. But these investigators like many others neither discounted the contribution of handling stresses on the weight gain nor other parameters of infected animals. The stresses were overlooked even where experimentally infected animals were not penned in individual cubicles but managed communally and chased around during repeated weighing exercises or suspended in nearly suffocating sacs on hook scales. But it is known that progression of infection in parasitaemic animals reach stages when damage to RBCs precipitated haemolytic crises and consequently reduced oxygenation of the blood. The extent to which such husbandry practices provide confounding stress to the infection process was not just overlooked but its influence could consequently be wrongly attributed to the parasite in many of those experimental infections. Yet it was often argued that where stresses are minimised in experimental trypanosome infection, it becomes difficult to precipitate clinical disease (Mare, 1998). Ruminants can gradually recover from trypanosome infection but stresses result in relapse (Kahn and Scott, 2010). It has further been observed that goats can withstand diseases where anaemia is precipitated (such as trypanosomosis) with a PCV as low as 9% if they are not stressed by handling (Matthews, 1999).

5.0 Conclusion

Repeated weighing of goats usually done to determine live weights preparatory to or during experimental trypanosome infection should be done by methods associated with the least extraneous stress as affected animals are intolerant to stress and in order to accurately assess primary pathogenic activity of infecting parasite. The innovated scale used in this work holds the potential to stem down over exertions of animals during weighing exercise and consequently reduce generation of extraneous stresses. It is therefore recommended for obtaining live weights of such animals.

Acknowledgement.
We acknowledge the assistance of Cyprian Ikyagh and Samson Akehe on construction aspects, Denen Ikyaaibo assisted in handling of animals.

References

Abebe G. (1991) Trypanosome Infection Causes dysfunction of the pituitary gland.Ph.D Thesis Abstract. Brunel University of London. In : *ILARD Reports* vol. 9 No 2 of 1991. P6

Agbo, E.C., Majiwa P.A.O., Classes M and Te Pas M.F.W. (2002) Molecular variation of Trypanosoma brucei sub species as revealed by AFLP finger printing.

Anosa V. O.,(1991) Prrevalence, Pathogenesis and Pathology of Africcan trypanosomiasis. In: Ikede, B. O. (Ed.) Control of animal Trypanosomiasis in Nigeria as a strategy for increased Livestock Production. *Proceedings*

of a Preparatory workshop in Vom. 5-9 June 1989 under EEC Lome III project on the control of animal trypanosomiasis in Nigeria.

Argiles, J.M.; Lopez-Soriano, J., Busquets, S. And Lopez-Soriano, F.J.(1997) Journey from Cachexia to obesity by TNF. *FASEB J.* 1997 11/10 (743 - 751).

Faye, D., Osaerr, S., Goossens, B. Van Winghem J., Dorny, P, P., Lejon, V., Losson, B. And Geerts, S. 2002. Susceptibility of trypanotolerant West African dwarf goats and F1 Crosses with the susceptible sahalian reed to experimental trypanosome congolense infection and interactions with helminth infections and different levels of diet. *Vet. Parasitol*. 108(2); 117-136.

Godwin L.J.(1979) In Pathogenicity of African Trypanosomes . *STRC /IDC,* 1979.

ILRAD International Laboratory for Research on Animal Diseases (1989) N'dama Cattle: Managing Africa's Genetic Resources. *ILARD Reports* vol. 7 No 4 P.1 Kahn and Scott, L. 2010. Trypanosomiasis. The Merck Veterinary Manual, tenth edition, Merck and Co. Inc. ISBN 0-911910-93-x, p.36.

Mare, C. J. 1998. African Animal Trypanosomiasis. In: part IV Foreign Animal Disease. United States Animal Health Association (USAHA) Richmond, USA pp. 29-40 Matthews J.1999.Diseases of the goat. Second Edition. Pp.266-349. Blackwell Science Ltd. Oxford.

McNitt, J.I. (1983) Livestock Husbandry Techniques. ELBS Edition, Granada Publishers Limited, London. ISBN 0 246 121076 PP79 – 85

Ogundipe, G.A.T., Lucas E.O. and Sanni A.I. (2005) Systematic Collection of Data. In : **Olayinka, A.I., Taiwo, V.O., Raji-Oyelade, A and Farai I.P.** (Eds.) Methodology of basic and Applied Research. Published by The Post graduate School, University of Ibadan, Ibadan. ISBN 978-37168-9-1 pp. 77-92.

Rabo, J. S. And Oyejide. A. 1996. Humoral immune response of West African Dwarf sheep to infection with *Trypanosoma Congolese* (Gboko strain) journal of *small ruminant research*, Elsevier publishers.

Steele M (1996) Goats. The Tropical Agriculturist Series Published in cooperation with CTA 6700 AJ Wageningen, The Netherlands by Macmillan Publishers, Limited. ISBN 978 0 333 52309 4 pp. 80-8.

FIGURES AND PLATES

Innovation (improvisation) of the scale

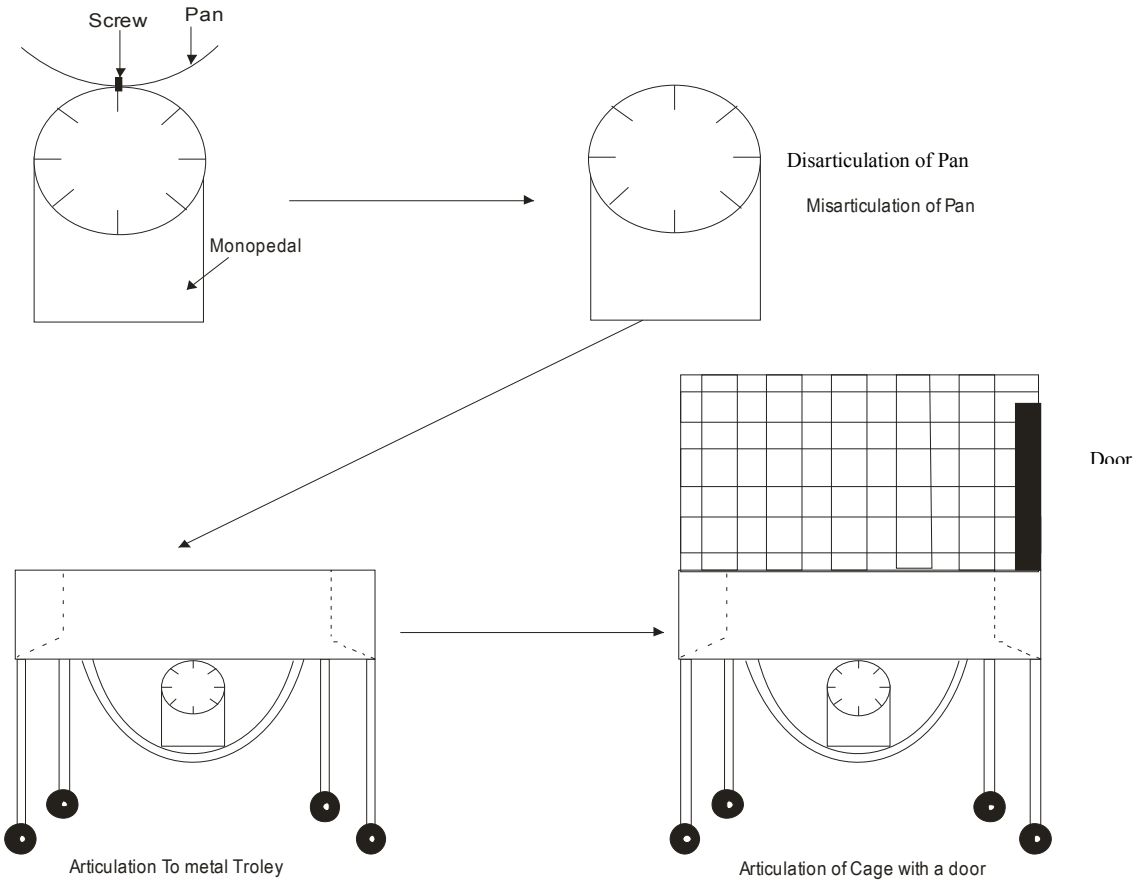

Fig. 1.0 Innovation steps

Plate 1.0 Assembly of Improvised Scale

THE SCALES IN USE

Plate 2.0 Taking Weight of Goat Using Hook Scale

Plate 3.0 Step-on Weighing Scale in use

Plate 4.0 Taking weight using Improvised Weighing Scale

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