CHAPTER 1 INTRODUCTION

1.1. Background of Study

The government encourages farmers to use various breakthroughs so that the strategy in livestock industries can improve the community socioeconomic status. According to Sirajuddin (2009), in order to achieve the goal of animal husbandry development to meet nutritional needs, the current development of animal husbandry has been directed towards the development of more advanced farms through a regional approach, the use of appropriate technology and the application of new foundations, namely efficiency, productivity and sustainability.

Livestock husbandry is essential in the country and 4.5 million households keep livestock, mainly in smallholder farming systems (Martojo, 2012). Beef cattle are an alternative choice because these animals are quite productive and some farmers develop this business for generations. The obstacle faced by farmers is that it is difficult to achieve optimal profits because breeding is a part-time activity coupled with the cattle trade chain, from breeders to end-consumers, has a long enough path that is very detrimental to farmers. (Artama, 2005; Alsaluri, 2009).

Cattle weight is important because, in addition to its ability to determine the selling price of cattle, it also affects the selection of seedlings, feed needs and the administration of drug doses (Sutardi, 1983). Weight determination techniques that use weight scaling tools is the most accurate way, but it has the disadvantage

in which expensive special tools and operator are needed. Weight estimation of cattle and weight scaling without the application of fasting also are the issue for determining the selling price of cattle in conventional markets. Farmers tend to overfed cattle in the attempt to increase its selling value. According to Prasetyo (2008), on the condition of meat in each traditional market Central Java regency, there are two kinds of meat namely dried meat derived from beef cut normally, then the wet meat derived from slaughtering *Glonggong* cattle, i.e. cattle which is being overdrunk with water for the purpose of increasing the weight of the meat.

According to an interview with the officers from Pasar Pahing Beji, livestock in conventional markets are often valued not by using its true bodyweight via fasting and carcasses, but instead by its unfasted bodyweight or considering its estimated bodyweight by means of body scoring and other weight estimation methods.

The development of technology and the internet give rise to e-commerce and manufacturer to customer (M2C) transaction activity. Cattle trade is no exception, according to a source from Dinas Perindustrian dan Perdagangan (Disperindag) of Tulungagung Regency, the decline in the year 2019 compared to previous years of conventional livestock trading through-the-market was believed to be caused by the rise of direct manufacturer to customer (M2C) transaction through the means of internet. But more often than not, M2C transaction did not provide expensive weight-scaling tools and the weight of cattle cannot be verified.

Determining weight without the use of scaling devices can also be done by weight estimation, although we should expect a range of error. Determining bodyweight by way of weight estimation can be done using body size. The idea of using body size to predict bodyweight is based on the fact that bodyweight is linearly related to body size (Slippers, 2000). Many bodyweight estimations through body measurements have been carried out in beef cattle (Wirdadeti *et al.*, 2009). Some important body sizes such as heart girth, body length, and shoulder height are general criteria for assessing cattle (Kadarsih, 2003). In the field of practice, determining the weight can be carried by some way of interpretation of heart girth, wither height, shoulder size or body length (Zurahmah, 2011). Weight estimation without the use of weight-scaling tools has a potential error which varies, with Schoorl formula up to 22.3% (Williamson and Payne, 1987). The error rate for Schaeffer and Lambourne formula are under 10% (Saputro, 2015). The difference in accuracy is affected by the structure of muscle, carcass, and fat (Frandson, 1992). According to Badriyah (2014), Schoorl formula has high accuracy when used in PO cattle which have weight over 300 kg.

Weight estimation methods should be applied for Limousin. According to Badan Pusat Statistik of Tulungagung Regency (2018), the majority of cattle circulated in Tulungagung Regency are of Limousin breed. Quoted from Blakely and Bade (1994), the Limousin cattle breed has a large percentage of meat and bones and is livestock that has efficient meat growth. This means that only a small amount of fodder is needed to produce great quality meat. Limousin is regarded as beef cattle. The weight of the bulls can reach 1,000 kg and females up to 600 kg

(Ensminger, 1987; Sosroamidjojo and Soeradji, 1990). Between the male and female species of livestock, farmer tends to use male as beef cattle while the females are treated as breeding cattle.

Based on the background mentioned above, this study attempts to find the best methods to estimate the unfasted bodyweight of male Limousin cattle in Pasar Pahing Beji Tulungagung. The study is done through comparing the validity of Schoorl and Schaeffer formulas when used to estimate the unfasted bodyweight of male Limousin cattle. The study also finds the validity of Rondo Tape method, and Schaeffer-derivated method such as Lambourne formula and *Rumus Modifikasi*. To provide comparation, the weight of unfasted Limousin bull was measured using calibrated digital scale at Pasar Pahing Beji Tulungagung.

1.2. Problem Statement

Based on this background, the formulation of this study are:

1. Is there a linear correlation between the unfasted bodyweight of Limousin bull of Pasar Pahing Beji Tulungagung and its heart girth and body length, and to weight estimation results of Schoorl, Schaeffer, Lambourne, *Rumus Modifikasi* and Rondo Tape method?
2. Are weight estimation methods of Schoorl, Schaeffer, Lambourne, *Rumus Modifikasi*, and Rondo Tape fit when used to estimate the unfasted bodyweight of Limousin bull in Pasar Pahing Beji Tulungagung?

1.3. Theoretical Basis

The weight estimation method included in this study is the formula of Schoorl, Schaeffer, Lambourne stated by Wahyudin (2008) and Kusuma (2016), *Rumus Modifikasi*, and Rondo Tape method.

The Schoorl formula is one of some of the most known formulas to estimate the bodyweight of cattle. Schoorl formula uses data from measured heart girth. Below is the Schoorl formula quoted from Kusuma (2016);

$$\text{bodyweight (estimated, in kg)} = \frac{(\text{heart girth (cm)} + 22)^2}{100}$$

Schoorl formula is only valid for adult cattle, not for the calf, as the added number 22 is too large for chest size in growing cattle (Saputro, 2015). The error rate known for Schoorl formula is approximately 22.3% on PO Cattle. According to Kusuma (2016), heart girth has more significant effect on the bodyweight of PO cattle of all ages, compared to wither height and body length.

The Winter (Schaeffer) formula uses data from measured heart girth and body length. This formula is a combination of body length and heart girth (Willianson and Payne, 1986). The error rate of this formula compared with scaled weigth ranges from 2-6% (Soenarjo, 1988). Lambourne adapted Schaeffer formula by converting the unit size of inch to centimeter and pound to kilogram

(Wahyudin, 2008). Below is the Winter (Schaeffer) formula according to Saputro (2015);

$$\text{bodyweight (estimated, in lbs)} = \frac{(\text{heart girth (inch)})^2 (\text{body length (inch)})}{300}$$

Weight estimation of Rondo Tape, or alternatively called Weight Band, is a fairly practical way, although the error rate is relatively varied among the breed measured. Rondo Tape is applied by perfectly fitting the measuring tape from behind the hump, covering the chest behind the shoulder joint.

According to Saputro (2015), a number of researchers have tried to prove the accuracy of the formulas tested on several groups of cattle between the estimated weight and the scaled weight. The result is that the Schaeffer and Lambourne formulas are closer to the actual real weights of cattle with an error rate below 10%, while the Schoorl formula has an error rate of 22.3%. Differences in calculation of weight in living things is natural, because the animal's weight is greatly influenced by the situation and environmental conditions, namely stress, feeding time, drinking amount, or the time of defecation. Even animals that are weighed, due to bad treatment and transportation can cause body shrinkage.

1.4. Aim of Research

The research objective is to:

1. Determine the relationship linearity between the unfasted bodyweight of Limousin bull in Pasar Pahing Beji Tulungagung and its heart girth and

body length and with the weight estimation results of Schoorl, Schaeffer, Lambourne, *Rumus Modifikasi* and Rondo Tape method.

2. Test the fitness of the weight estimation formulas of Schoorl, Schaeffer, Lambourne, *Rumus Modifikasi*, and Rondo Tape when used to estimate the unfasted bodyweight of Limousin bull in Pasar Pahing Beji Tulungagung.

1.5. Research Outcome

The results of this research are expected practically to provide information to the veterinary community, farmers, and livestock market agents about the methods to estimate the bodyweight of unfasted Limousin bull through the benchmark of the heart girth and body length.

1.6. Hypothesis

1. There is linear correlation between the unfasted bodyweight of Limousin bull in Pasar Pahing Beji Tulungagung and its heart girth and body length, and to the weight estimation results of Schoorl, Schaeffer, Lambourne, *Rumus Modifikasi* and Rondo Tape method.
2. Weight measurement methods of Schoorl, Schaeffer, Lambourne, *Rumus Modifikasi* and Rondo Tape are fit when used to estimate the unfasted bodyweight of Limousin bull.