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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 7 (3): 389-392, 2004
ISSN 1028-8880

Effect of Different Calf Hutch Types on Black and White Calf Performances

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Abstract: The present study was carried out to investigate the effect of different type of calf hutches on growing performance and housing expenses of Holstein calves. Twenty five female calves born from February 2003 to April 2003 in Agricultural Faculty Farm, University of Çukurova, Adana, Turkey were used in the experiment. Birth weights for new material, Fiberglas and double layer tin-plate groups were 36.61±1.57, 36.44±1.19 and 34.81±1.70, respectively. The daily weight gain averages for the tint material, Fiberglas and double layer tin-plate groups were found 367.68±31.49, 319.22±27.69, 294.43±21.64 g d^{-1}, respectively. The differences between the groups were not statistically significant ($P<0.05$) for calf hutches groups. All calves were kept together with their mothers for the first 3 days after calving and then were housed in individual pens in calf hutches. All calves were fed whole milk via pail twice a day according to the feeding programme, in which each calve received 245 litre feed during 10 weeks period in total. Calves were also received a commercial calf grower and alfalfa straw *ad libitum* from first week of the trial to the weaning. Fresh water were supplied to the calves ad libitum in pail after consuming their liquid feeds. The results obtained in the experiment showed that there were no differences in daily gain, conversion and weaning weight ($P>0.01$). New type hutch housing compared to fiberglas or double layer tin-plate groups in respect to calf performances but housing expenses was the lowest group for new material hutch type.

Key words: Calf hutches, rearing, economy

INTRODUCTION

Within the recent years, rearing the calves in calf hutches has become a widely accepted housing systems for intensive dairy farm. It is known that calf hutches are one of the most effective management practices for improving performances of calves during the calf rearing period. The conditions that surrounds the calf has very big importance on the calf performance[1-6]. The general principles of good housing should include a dry, soft insulated floors during rest, avoiding draughts at calf level and providing adequate ventilation to ensure sufficient air changes occurs, thus avoiding the build up of ammonia and infectious organisms. While good housing conditions do not ensure that disease outbreaks will be prevented, they will reduce the severity of the outbreak. Especially in the places which have hot and humid climate, calf hutches are suggested as a good housing system and this system is preferred compare to the other housing systems.

Many experiments were carried out under various climate conditions on the effects of different type of calf hutches on calves' performance and it is reported that, even under cold conditions, there have seen no health problem[7-18]. It is observed that this application has been increased in Turkish intensive cattle farming systems. Although the fiber-glass hutches have a large area of use field, due to some other reasons, the studies towards building calf hutches of different material and sizes are carried on. As it is already known, dimension and shapes change the physical environment that is supplied by the housing to the animal[1,3].

In cattle breeding, although heat stress is of great importance on milk production, reproduction and fattening performances, the same importance is not seem to be given in the case of calves. Whereas, there have seen problems in the case of calves due to heat stress issue. Some of these problems include rise in the body temperature, increase in the respiration, appetite losing and increase in the water loss and consumption. Especially if an animal is exposed to negative conditions in the early rapid growth period, the effect of this negative condition will be seen in the subsequent performances. If a female calf is exposed to temperature stress in the growing period, it is reported that there will be a $ 189 lost in the first lactation milk production[19].

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Table 1: The milk feeding programme

	1 Week			Weeks								
Application	1st-4th days		5th-7th days	2	3	4	5	6	7	8	9	10
Milk (L/day)	Colostrum	Morning	1	1.5	2	2	2.5	2	2	2	1.5	1
		Evening	1	1.5	2	2	2.5	2	2	2	1.5	1
Calf starter			Ad libitum									
Alfaalfa hay			Ad libitum									
Water	Ad libitum											

In the present study, it has been aimed that to develop a calf hutch type which will meet the calves requirements and will be constructed under farmers conditions by using simple material economically.

MATERIALS AND METHODS

Twenty five black and white female calves born within the months of February and April in Research and Production Unit of Agricultural Faculty Farm, University of Çukurova, were used in this study.

All calves were kept together with their mothers for the first 3 days after calving and then were housed in individual pens in calf hutches. Calves were fed colostrum as soon as possible after birth during the 3 days period. Between day 4 and 70, calves were fed whole milk via pail twice a day according to the feeding program, in which each calve received 245 L milk during 10 weeks period in total. Twenty four calves were assigned to calf hutches group randomly. In addition, they were received a calf starter, good quality alfalfa straw ad libitum. Water was available to all calves at all times. Water was provided in the bucket used for the milk feeding.

The calves were fed according to the milk drinking programme given in Table 1.

The chemical composition of calf starter and alfalfa straw which are used in this experiment is presented in Table 2.

Table 2: The chemical composition of calf starter and alfalfa straw

Feeding substances	calf starter	Alfalfa straw
Dry matter %	87.7	89.7
Crude protein %	16.5	15.0
Crude cellulose %	9.7	26.0
Crude fat %	3.2	3.4
Ash %	5.9	8.4

Calves were weighed at birth and at the beginning of every 14th day for 2.5 consecutive months. Individual calf starter and Alfaalfa hay consumption and refused were recorded weekly for each calf.

As calf hutches types which were made from tin-plate (Fig. 1) Fiberglas (Fig. 2) and the hutches that are constructed by using white tent materials in this study (Fig. 3) were used. The hutches that are made from tin-plate were construct by using two-layer of tin-plate that

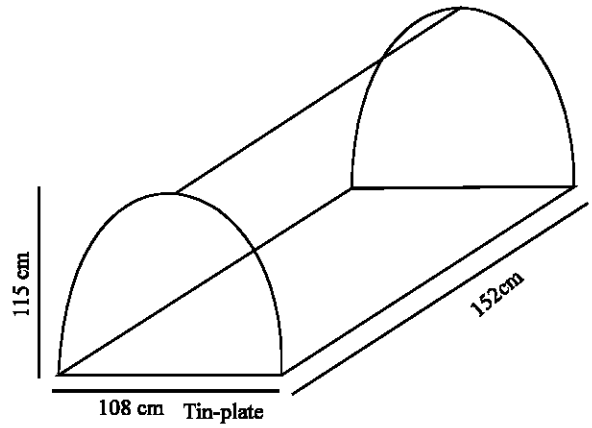

Fig. 1: The dimensions of the hutch that is made from tin-plate

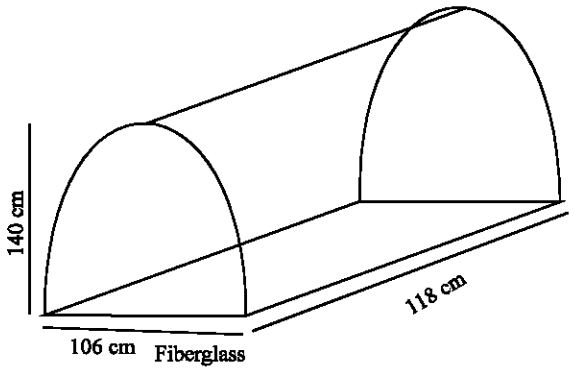

Fig. 2: The dimensions of fiberglass hutch

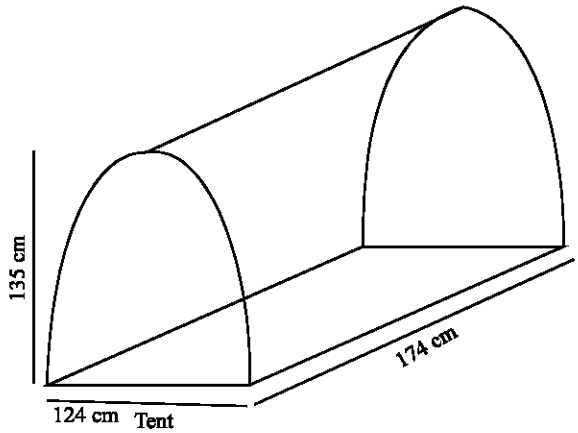

Fig. 3: The dimensions of the hutch that is made from tent material

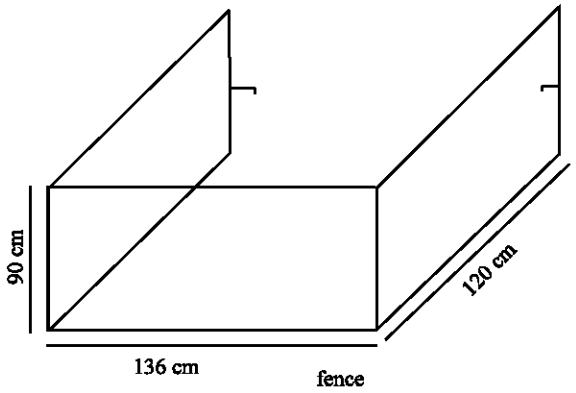

Fig. 4: The dimensions of the fence

are generally used in making tins and straphor were filled between this two layer tin-plate. The fiberglass one is bought from a fiberglass company and it is the standard fiberglass hutch that is sold in the market. Each type of hutch has same padox which was made of iron bond which is used in concrete production (Fig. 4).

The hutches were kept under the trees which provides natural shadow for the calves. The cost of the tent and tin-plate hutches which were produced at Dairy Unit of Agricultural Faculty of Çukurova University were 38,000,000 TL and 89,000,000 TL, respectively and the sales price of the tin-plate hutches which were bought from another supplier was 250,000,000 TL (At the time when these costs were calculated, the Dollar Exchange rate was 1,460,000 TL).

The environment temperature and the relative humidity were determined by the climatic data recording machines which were placed into the calf hutches. The temperature-humidity index value (Temperature-Humidity Index (THI)) were calculated by using the following formulation[23].

THI = 0.72 (Ta + Tdp) + 40.6
THI = temperature-humidity index value
Ta = Dry thermometer value (°C)
Tdp = Wet thermometer value (°C)

The experiment was carried out according to the coincidence parcels experiment plan and analyzed by using SPSS programme.

RESULTS AND DISCUSSION

None of the calves was culled during the experimental period and the animals of both housing systems did not receive any treatment for gastrointestinal disorders and respiratory diseases.

Table 3: Growth performance of the experimental groups during the experiment

	Hutch material types		
Properties	Tent (N =9)	Fiberglass (N=9)	Tin-plate (N=6)
Birth weights (kg)	36.61±1.57	36.44±1.19	34.81±1.70
Weaning weights (kg)	62.35±2.14	58.79±1.64	55.42±1.34
Average Daily weight gain (g)	367.68±31.49	319.22±27.69	294.43±21.64
Calf starter intake (g day^{-1})	295.90±27.28	258.79±20.24	265.24±23.54
Alfalfa hay intake (g day^{-1})	210.16±25.11	199.98±15.35	178.30±28.70
Feed efficiency (kg)	1.53±0.24	1.51±0.16	1.58±0.25

Table 4: The number of the days during which the THI values are over 70 THI threshold value and its distribution

Hutch type	Number of the days	Maximum THI value
Tin-plate	14	81
Fiberglass	28	79
Tent	36	82

In agreement with previous studies[18] calves daily weight gain through out the experimental period was not significantly affected by the housing systems and as resulted 331.19 g day^{-1} on average (Table 3). While the calves which were kept in the hutches made from fiberglass and tent material showed over similar performance (over 300 g day^{-1} ADWG), the ones that were kept in tin-plate hutches showed lower performance (under 300 g day^{-1} ADWG). But the difference between the groups did not found statistically significant.

The ADWG values that are reported in this study were lower than the values that were reported by Tümer[17], Göncü and Özkütük[18] however, they are similar to the ones reported by Görgülü *et al.*[20] and Das *et al.*[21]. In terms of weaning values, again the values are lower than the ones that were reported by Tümer[17] Göncü and Özkütük[18] but similar with the ADWG values that were reported by Görgülü *et al.*[20]. However, the weaning period of Tümer[17] was 12 weeks and this 2 weeks period difference between the one that is applied in this study (10 weeks) may be the reason of this result difference. No difference was found in calf starter intake, Alfaalfa hay intake and feed efficiency values of the experimental groups.

The hutch dimensions that were used in the experiment of Göncü and Özkütük[18] were different from the dimensions used in this study and the effect of the hutch dimensions on the calf performance is significantly emphasized by the researchers[1-6].

The best development that is seen in the calves is between 13-25°C[19,22]. However when examined the figures generally, it is seen that the THI values of the experimental period between May-June months exceed the

72 THI threshold value where measure should be taken. The number of the days during which the THI values are over 70 THI threshold value for the three hutches and maximum THI values are given in Table 4.

The average, maximum and minimum values of THI which is obtained from the climatic data bases that belong to each of the hutches within the experimental period, did not show different curve during the experimental period.

Also similar values observed in terms of minimum THI values but it is understood that the maximum values of the hutches that are made up of fiberglass and tent material is higher than the maximum value of the tin-plate ones in terms of maximum THI values. It can be said that, tin-plate hutches show lower maximum values than the other two types of hutches in terms of maximum values.

Under these circumstances, especially at the hot and humid climate, it is important to determine such a hutch type and dimension that is not affected from the outside conditions quickly. The fact that the performances of the calves that are in tin-plate hutch are lower than the other two, but at the same time the lower maximum THI values have seen in this type hutch. It shows that it is possible to obtain better results by means of improvement studies in this type of hutch.

In addition, it is understood that the tent material is cheaper than the other two hutch types in terms of the economical consideration. It is clear that better performance obtained by the arrangements that enable necessary ventilation in this hutch, will bring positive contribution.

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