Lean Lamb - 1998 Sheep Day Report

Lean Lamb Production

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Introduction

NDSU has been collecting data for four years on factors that will aid sheep producers in producing lean lambs with high growth rates. The first objective of this project was to develop accurate prediction formulas which determine lean mass in the live animal and its carcass. The second objective was to utilize the formulas in establishing an effective expected progeny difference value that would prove valuable and economical to any sheep producer. The prediction formulas have been statistically analyzed and an Within Flock EPD has been developed based on the following conclusions.

A portion of this project evaluated an electronic instrument called a Bioelectrical Impedance Analyzer (BEI). The BEI machine measures the amount of low energy current which is absorbed and dispersed through the body. Lean tissue conducts an electrical current differently than does fat, so the measurements taken from the BEI were used to develop mathematical formulas which predict fat free mass. This machine was used on the live animal and its carcass during the project.

Procedure

Prediction equations were established for the live lambs and their carcasses based on Bioelectrical Impedance Analyzer (BEI) measurements. The complete data set (CDS) (n=441) had pooled data that contained standard carcass measurements and carcass BEI. Within this set are subgroups: DS (n=217) contained lambs that had standard carcass measurements and BEI measures, DS2 (n=182) were lambs with recorded live and carcass measures and DS3 (n=42) consisted of Columbia lambs with known sires. The established formulas developed from DS and DS2 were used to develop within flock expected progeny difference (WFEPD) values on individuals with identified sires found in DS3..

Results

DS1 had cutout data of lambs slaughtered at the NDSU Meats Laboratory and processed to trimmed retail product. The weight of the fabricated wholesale cuts, denuded of subcutaneous fat, were used as the dependent variable that developed the total retail product (TRP) equation when compared to measurements taken from the pooled data set. CDS contained cold carcass weight (CCW), fat depth (FAT), bodywall thickness (BW) and ribeye (RE) that were used to develop a multiple regression formula for total retail product (TRP): An# = 4.80 + (0.5710*CCW) - (7.36*FAT) - (5.87*BW) + (1.39*RE). This formula produced an R-squared of .94 when compared to the actual trimmed retail weights obtained from DS1. Based on the Impedance and cold carcass measures within this set, a BEI

cold carcass formula was developed which had an R-squared = .91:

BEI_c = 6.72 + (.4818*cold carc wt) - (.0314*Rs_c) - (.0481*Xc_c) +

(.254*Ln_c) + (.0223*temp)

Rs_c = Resistance from BEI instrument

Xc_c= Reactance from the BEI Instrument

Ln_c= Length between electrodes

DS2 contained lambs which were evaluated by BEI prior to slaughter and were used to develop a BEI prediction formula for the live animal. The prediction formula developed was:

BEI_L = .0973 + (0.3118*livewt) + (0.17*Rs_L) + (0.1739*Xc_L) -(0.0102*Ln_L).

The live animal (BEI_L) had an R-squared of .79. Table 1 shows the summary of all lambs in data set 2.

DS3 verified the formulas found from DS and DS2 . The formulas were found to be quite accurate with an entirely different set of animals. Table 2 gives the average carcass characteristics DS3.

An# = .82

BEI_c = .84

BEI_L= ..64

Sire groups taken from the entire complete data set (CDS) were used to develop EPD's on sires who had more than 10 offspring tested. Table 3 shows the summary of the complete data set analyzed. The values were based on the breed average within the flock which was called Within Flock Expected Progeny Difference (WFEPD). WFEPD values for sire groups were based on retail value per day of age:

RP$ = (trim shoulder wt* $2.89) + (trim rack wt.* $4.75) + (trim loin wt * $7.98) +

(trim leg wt.* .90 * $4.98) + (breast, flank, etc. wt.* .50 * $.85) / age in days.

Prices were based on March 5th averages from retail stores in the Fargo-Moorhead area.

The numbers .90 and .50 were multipliers developed from DS1 to get the boneless weight.

The RP$ were used to calculate WFEPD by the expected progeny difference formula:

EPD = N*h2/2* [1 + (N-1) * h2 * r] * [Ps - P] (Spike et al., 1991).

h2 = heritability of pounds of TRP (.40)

N = number of records

r = repeatability

Ps = average performance of selected individual

P = population average

The WFEPD values for the Columbia identified sire group ranged from -.131 to 0.209. Table 4 shows the WFEPD values for the sires who had more than 10 offspring who were evaluated. There is variation in the sire WFEPD values for the Columbia identified flock.

Conclusion

The data accumulated from all three data sets was analyzed and shows that pounds of lean mass or total retail product can be predicted by using BEI both on the live animal and its carcass. The accuracy of the live animal prediction formula can be used in the establishment of a Within Flock EPD value based on actual pounds of retail product. This value is an accurate, economical and unbiased tool which can aid producers in identifying breeding stock that have the genetic potential to produce fast growing, lean lambs.

Prospective

A feedlot trial using lambs with identified sires and dams from this project will begin in the next year. The objective of this project is to further the accuracy of the WFEPD value when it is used on a large group of lambs in a consistent environment who are on the same nutritional plain.