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**ESTIMATES OF
PHENOTYPIC AND GENETIC PARAMETERS IN
BALI BEEF CATTLE**

**A thesis
presented in partial fulfilment of
the requirements for the degree of
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ABSTRACT

The study analysed records on weaning (3803) and yearling weight (2990) of beef cattle (*Bibos banteng*) from the Bali Cattle Improvement Project. The main purpose of the study was to derive heritability estimates and phenotypic and genetic correlations between weaning and yearling weights for inclusion in a selection index. Variance components were estimated by Henderson's Method III and REML methods.

Village, year of birth, sex and age (as a covariate) of the calf significantly ($P < .05$) affected weaning weight. Age of dam had a small effect ($P = .08$) while season of birth had no significant effect on weaning weight. Village, year of birth, age of dam, sex and age of the calf as a covariate significantly ($P < .05$) affected yearling weight while season of birth had no significant effect. When first order interactions among fixed effects were included in the model for weaning weight, village by year, village by season, year by season, year by sex of the calf and dam age by season and by sex of the calf were significant ($P < 0.05$). For yearling weight, village by year, season of birth, age of dam and sex of the calf, sex by year of birth and age of dam and season of birth by age of dam interactions were significant ($P < 0.05$).

Least squares means (LSM) \pm standard error (SE) for weaning and yearling weight by village contemporary group ranged from 79.4 ± 1.18 kg to 94.4 ± 1.08 kg and from 124.1 ± 1.7 kg to 153.8 ± 1.7 kg, respectively. Weaning and yearling weight LSM \pm SE (kg) for years of birth of 1983, 1984, 1985, 1986 and 1987 ranged from $77.6 \pm .82$ and $134.8 \pm .86$ to $88.6 \pm .51$ and 147.1 ± 1.03 , respectively. The LSM \pm SE (kg) of weaning weight of calves from dam with age 2, 3 and more than 3 years were 83.9 ± 1.16 , $85.4 \pm .43$ and $86.1 \pm .30$, respectively. LSM \pm SE (kg) of yearling weight of those dams were 140.4 ± 1.72 , $134.7 \pm .68$ and $139.4 \pm .48$,

respectively. The $LSM \pm SE$ (kg) of weaning and yearling weight for bull and heifer calves were $89.8 \pm .49$ and $145.5 \pm .75$, and $80.5 \pm .49$ and $130.9 \pm .75$, respectively.

Age at weighing as a covariate was highly significant ($P < 0.01$) for both weaning and yearling weights. Regression coefficients of weaning weight and yearling weight on age were .30 kg / day and .20 kg / day, respectively.

Heritability estimates obtained by Henderson's Method III for weaning and yearling weights were $.11 \pm .03$ and $.13 \pm .04$, respectively, and the genetic correlation was estimated as $.64 \pm .10$, respectively. REML estimates were similar. The phenotypic correlation between weaning and yearling weights was .32. There have been no previously reported estimates of these parameters for Bali cattle. However, these parameter estimates fell into the lower end of the ranges reported in the literature for other cattle breeds.

Selection of animals based on a selection index including weaning and yearling weight would lead to increases in both carcass weight and fat depth. Increases in fat depth did not offset the increased payment for carcass weight. The use of a restricted index for keeping fat depth unchanged was also examined, but this severely restricted the gain in carcass weight resulting in relatively poor economic gains.

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