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The improvement and export potential of Bali cattle (*Bos bibos-banteng*)

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ABSTRACT

New Zealand is involved in the improvement of the Bali breed of cattle in Indonesia through a bilateral aid project.

From 1977/82 significant improvement has been achieved in the Bali Cattle Development Project — 5 kg, 6 kg and 22 kg improvement in weaning, yearling and rising 2-year-old live weights respectively and 21% improvement in calving percentage.

Establishment of a central breeding herd of elite Bali cows is planned with top performance and progeny tested bulls being made available to the local farmers through artificial breeding.

The unique qualities of Bali cattle enhances its export potential throughout many tropical and subtropical countries of South-East Asia and the Pacific.

Indonesia supports a cattle population of about 6 million, with an average number per holding of 2.1. Bali cattle represent about 29% of this total. They are widely distributed throughout the many islands of Indonesia with the heaviest concentration being on Bali, Timor and Sulawesi. They are also found in Malaysia.

Bali cattle represent a unique resource in the world's tropical fauna. The breed is a domesticated banteng originating probably on the island of Bali but certainly in Indonesia. Wild banteng are found in very small numbers of Eastern and Western Java and probably in larger numbers on the island of Kalimantan.

Indonesians now appreciate the potentiality of Bali cattle in their tropical agriculture. They provide a much-valued food resource for Indonesia and also draught power to assist in the cultivation of paddy fields where the staple food, rice, is grown for its 140 million people. As the Indonesian authorities tackle their immense population problem through progressive birth control and transmigration programmes, local people are given the opportunity and financial assistance to own land and a few head of cattle on outlying islands away from the overcrowded island of Java.

Bali cattle number about 1.8 million in Indonesia. They play an important socio-economic role particularly for Indonesians given a new start to life as peasant farmers.

In 1976 the Indonesian Minister of Agriculture decided that an improvement programme should commence for the indigenous breeds of cattle, with priority being afforded to the Bali breed. The objectives of this programme were:

- (i) to develop and increase Bali cattle as a valued resource;
- (ii) to increase their productivity through genetic selection;
- (iii) to increase farmers' incomes;
- (iv) to increase work opportunities of the village farmers and to improve their knowledge of animal breeding and husbandry;
- (v) to meet the industry demand for Bali cattle within Indonesia and later as an export commodity.

By 1977 the Bali Cattle Development Project (P3 scheme) had begun operating with units being established within the villages of Bali to act as nuclei for this development and improvement work.

More recently New Zealand has become involved in this project through its Bilateral Aid to South-East Asia. In 1981 Dr G. C. Everitt and I visited Indonesia to study the feasibility of further improvement programmes for Bali cattle. Some recommendations offered in our report have been accepted and our continued involvement in this project represents one of the few programmes known for improving levels of production of a native cattle breed within its own environment.

The P3 scheme currently operates through 5 units serving 23 villages and 2200 farmers involving the recording of approximately 10000 Bali cattle. Peasant farmers bring in their few head of cattle to the unit where the adults are vaccinated, sprayed with insecticide, drenched, pregnancy tested and weighed. New calves are tagged, vaccinated and weighed, all these details being recorded on cards. Farmers are advised to use superior weight-for-age bulls across their cows. These bulls are identified through the P3

scheme and replace poorer quality bulls previously used. Farmers are encouraged to attend courses run by the scheme aimed at improving their animal husbandry and management skills. They also have the opportunity to obtain from their local unit the seed of improved grasses and legumes which will help lift the nutritional level of their cattle.

Substantial improvements have been recorded in the years 1977/82 between the average performance of the 10000 Bali cattle in the P3 scheme and the average performance of Bali cattle outside the scheme. The main performance traits of these 2 groups are summarised in Table 1.

TABLE 1 Performance traits of Bali cattle in the P3 scheme compared with those outside the scheme.

Trait	Bali cattle	
	P3 scheme	Remainder
Calving %	79.8	58.6
Birth weight (kg)	16.9	15.7
Weaning weight (kg)	90.0	85.0
Yearling weight (kg)	136.0	130.0
Rising 2-year weight (kg)	225.0	203.0
Age at puberty (d)	562	618
Calving interval (d)	420	520

Significant improvements have been achieved by:

- (i) culling sterile bulls;
- (ii) selecting regular breeding females;
- (iii) selecting progeny with better growth rates;
- (iv) improved husbandry and levels of nutrition.

Data collected through the P3 scheme suggest that the Bali breed is very fertile. While the oestrous cycle of Bali cows is apparently of the same duration as in other breeds the heat period lasts for a mean of 37.5 ± 9.5 h, considerably longer than other Indonesian cattle breeds. The reproductive performance of heifers and young cows in the P3 scheme is summarised in Table 2.

TABLE 2 Reproductive performance of Bali heifers and cows.

	No. in sample	No. pregnant	Percentage
Maiden heifers	1,190	994	84
2nd calvers	930	820	88
3rd calvers	817	760	93
4th calvers	310	288	93

It is normally 2½ to 3 years of age before Bali bulls are first used for service and 3 years of age before a cow first calves. This is due to the poor milking qualities of the Bali cow and the slow growth rates of young cattle. This can be partly explained by the fact that Bali cows are well suited for draught purposes in the paddy fields. Normally it is the 2-year-old females which are trained to work the light soils and can spend 5 hours each day for a month pulling the plough without apparent ill effect. Bulls or steers are not used for draught purposes as their temperament is suspect and they are not as easily trained.

Future Improvement

While acknowledging the establishment, objectives and progress to date of the P3 scheme, one of its limitations is that superior sires cannot be identified through the performance of its progeny and no lifetime production figures are available for cows within the scheme.

New Zealand's aid to date has included the designing of a beef recording scheme and the purchase of a microcomputer which will cater for the current and future needs of the project. Landrovers and motor-cycles have been purchased for the project which will allow more units to be established and an increased number of cattle to be recorded. The scheme will be used to identify elite cows — cows with the ability to regularly calve and wean a heavy calf — within each of the 5 units. Ultimately these elite Bali cows will be brought together and run as a central breeding herd on an area of 150 hectares donated by the Governor of Bali specifically for the purpose. New Zealand's future aid will also help in the development of this block. Bulls produced in this herd will be performance and progeny tested with the elite bulls going forward to an AB centre for semen collection. This semen will then be available for use in the central herd as well as at the village level to upgrade Bali cattle on a wider base.

Export Potential

An early national benefit for Indonesia lies in the exporting of semen from proven Bali bulls from Bali to other islands within Indonesia — Lombok, Sumbawa, Timor and South Sulawesi where 1.5 million Bali cattle are run by mainly transmigrant farmers. To date there has been no recording and very little selection on any of these cattle. However, improvement programmes closely related to the P3 scheme on Bali are planned for these islands.

Bali cattle are a unique tropical species. Once their full potential is realised by other developing nations they should prove valuable in tropical and subtropical countries in South-East Asia, the Pacific and beyond.