

Review

Promoting Sustainable Utilization and Genetic Improvement of Indonesian Local Beef Cattle Breeds: A Review

Nuzul Widyas^{1,*}, Tri Satya Mastuti Widi², Sigit Prastowo¹, Ika Sumantri³, Ben J. Hayes⁴ and Heather M. Burrow⁵

¹ Department of Animal Science, Universitas Sebelas Maret, Surakarta 57127, Indonesia

² Faculty of Animal Science, Gadjah Mada University, Yogyakarta 55281, Indonesia

³ Department of Animal Science, University of Lambung Mangkurat, Banjarbaru 70714, Indonesia

⁴ Queensland Alliance for Agriculture and Food Innovation, University of Queensland, 306 Carmody Road, St Lucia 4067, Australia

⁵ Faculty of Science, Agriculture, Business and Law, University of New England, Armidale 2351, Australia

* Correspondence: nuzul.widyas@staff.uns.ac.id

Abstract: This paper reviews the literature relevant to the breeding of cattle grazed in tropical environments and particularly Indonesia. The aim is to identify new breeding opportunities for cattle owned by Indonesia's smallholder farmers, whilst also conserving unique local cattle beef breeds. Crossbreeding has been practiced extensively in Indonesia, but to date there have been no well-designed programs, resulting in many mixed-breed animals and no ability to determine their genetic composition, productive capabilities or adaptation to environmental stressors. An example of within-breed selection of Bali cattle based on measured live weight has similarly disregarded other productive and adaptive traits. It is unlikely that smallholder farmers could manage effective crossbreeding programs due to the complexities of management required. However, a tropically adapted composite breed(s) could perhaps be developed and improved using within-breed selection. Establishing reference population(s) of local breeds or composites and using within-breed selection to genetically improve those herds may be feasible, particularly if international collaborations can be established to allow data-pooling across countries. The use of genomic information and a strong focus on all economically important traits in practical breeding objectives is critical to enable genetic improvement and conservation of unique Indonesian cattle breeds.

Keywords: beef cattle; tropical environments; crossbreeding; within-breed selection; genomic selection; productive traits; resistance to environmental stressors; reference populations; breed conservation



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1. Introduction

About 120 million Indonesians, or ~11% of the country's total population, live on less than USD2 per day, with another ~40% of Indonesia's population vulnerable to falling into poverty as their income hovers marginally above the national poverty line. The agricultural sector employs two thirds of Indonesia's poor and hence, it represents a vitally important component of Indonesia's economy.

Demand for beef in Indonesia has been increasing due to growth in population and household income. However, demand has been outstripping supply, and the self-sufficiency ratio at a national level has hovered around 65% over the past 10 years, requiring 30–40% of beef to be met by imports, mainly live cattle and frozen beef from overseas [1].

About 6.5 million smallholder farmers living in rural areas across Indonesia produce ~90% of the beef produced in Indonesia, while the remaining ~10% of beef production is delivered by a small number of commercial farmers (<1% of all beef farmers) and large beef cattle companies concentrated primarily in Java [2]. A very strong opportunity, therefore, exists to strengthen Indonesia's beef sector, to improve the productivity and profitability of smallholder beef farmers and to also improve the livelihoods of Indonesia's rural poor.