1 INTRODUCTION

Since three decades, sustainability is a popular term used in almost every discipline including agriculture, environmental and economic studies. Related to agriculture, sustainability was defined according to the type of production systems such as crop production (Kilian et al., 2006; Subedi et al., 2009), livestock production (Vavra, 1996; de Boer and Cornelissen, 2002; Waltrick, 2003; Mollenhorst, 2005), or mixed system (Rigby et al., 2001; Dougill and Reed, 2004), depending on the background of the stakeholders such as farmers, policy makers, researchers and consumers. Although there is still no general consensus in defining the term, the practical definition of the term refers to the ability of the system to maintain the production in a long period of time.

Recent studies in the literature showed a clear consensus to move forward from defining the sustainability to estimate it by using tools and indicators. By estimating the level of sustainability, the strengths and weaknesses of farming systems can be distinguished. This may serve as a guideline for decision makers in planning interventions and strategies in order to improve the farm performance in terms of its long term productivity that in turn is expected to improve the living conditions of farmers and rural areas.

Livestock production systems in Indonesia are generally small-scale with one to three cattle per household, raised mostly in the eastern part of Indonesia on wet and dry lands under traditional management (Hadi et al., 1999). The traditional system is characterised by low levels of economic efficiency derived in a diversified agricultural system, based on a few ha of land to support household needs (Devendra and Thomas, 2002). On the other hand, demand for livestock products on local, national and regional level have increased sharply since the last decade. Pengely and Lisson (2003) predicted that the demand will be doubled by the year 2020 as a result of increasing human population which already reached about 231 million people in 2009 (CBS, 2010). Thus, livestock production will be expected to produce more to satisfy the increasing demand.

In 1999 the national government of Indonesia released the regulation no. 22 to assign a greater responsibility for the provincial governments to manage their own area to achieve food and income sufficiency for the people (GoI, 1999). The regulation mandated every provincial government, including Maluku province, to improve the living conditions of

farmers while increasing the production to satisfy the local demand by creating own development pathways.

In Maluku province, Ceram Island and Buru Island were selected as the main agricultural areas to support the provincial food security policy, in terms of both crop and livestock production, based on the regulation no. 421/2005 (GoMP, 2005). The development paths are based on the project of distributing Bali cattle directly to two different ethnic groups on Ceram Island. They are indigenous farmers who live as crop farmers, livestock keepers and fishermen (Lebel, 1999), and transmigrant farmers who came gradually since 1954 as part of a national transmigration project, settled on the Island and live as food crop farmers mainly producing rice and later became cattle keepers. This project aimed to increase beef production in the province in order to fulfill the increasing market demand (Attamimi, 2003). The fact that the province is composed by islands and is rich in water resources did not deny the importance of beef production in the province. Beef production, dominated by Bali cattle was meant to reach the provincial consumption target of 4.5 kg meat/capita/year in Maluku by 2012 from 2.7 kg/capita/year in 2002 (Dinas Pertanian Provinsi Maluku, 2005), to complement the protein consumption from fish of 4.0 kg/capita/year (Martianto et al., 1993). The Central Bureau of Statistics of Maluku Province (2010) reported the increasing demand for beef from 1.6 ton in 2000 to 3.8 ton in 2007. The high demand for Bali cattle in recent years on local and regional markets to provide meat created pressure on their population, leading to a selling of cattle. Decisions for selling animals were taken to realise immediate gains rather than applying a long-term management. Consequently, the population of Bali cattle decreased from 76,864 heads in 2004 to 70,402 heads (CBS, 2010). Hence, strategies and interventions should be developed in favour of a sustainable increase of the production by analysing the production systems, taking into account the national commitments to the principles of sustainable development, and then focussing attention towards resource efficiency, environmental and sustainable production issues (Hadi et al., 2002).

To understand current production conditions, the general hypothesis of this study is: resources, productive and reproductive performance of beef production in the mixed farming systems on Ceram Island differ according to the migratory status of the farmers, leading to different levels of sustainability, productivity of beef production and economic efficiencies. Therefore, different strategies and interventions are needed to improve the systems. The study aims at contributing to the knowledge base needed for the design of sustainable beef production systems on the Island.

The specific objectives can be mentioned as:

- To characterize and compare the farming systems and beef keeping management of Bali cattle,
- To develop a set of sustainability indicators based on locally identified issues,
- To evaluate current sustainability of beef production with Bali cattle in indigenous and transmigrant farms.