

## Phenotypic And Genotypic F2<sup>th</sup> and F3<sup>th</sup> Performances Candidate of The New Breed Ongole Croosed Agrinak Cattle

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### ABSTRACT

Increasing of domestic beef production, can be done by forming a new breed of beef cattle that are low-quality feed resistant. The aim of this research to know phenotypic and genotypic performance (since birth/calf until become cow/bull) of Ongole Croosed (OC) cattle, as parents who will produce candidates of the new breed OC *Agrinak* cattle that are low-quality feed resistant. The research during two generations (7 years) conducted at experimental stall in Beef Cattle Research Station, used 201 heads OC female and 28 heads OC male as its F2<sup>th</sup>, also 328 heads OC female and 29 head OC male as its F3<sup>th</sup>. Ration contain low quality nutrient (crude protein 8-9%, crude fiber 22 to 26%, organic matter 85-87%, total digestible nutrients 53 to 55%). Penotipic observation was done by weighing and measuring of cattle, while genotypic observation was done by *polymerase chain reaction* (PCR) and Sequencing analysis. Parameters observed: weight and hump high at birth, weaning, 12 and 24 months and at first mating ages; also sequence of nucleotide acid growth gene GH891. Phenotypic data is processed and presented descriptively, while genotypic data used *Bio edit* program. The results showed: weight and hump high at birth, weaning, 12 and 24 months and at first mating ages between F2<sup>th</sup> and F3<sup>th</sup> were: 24.8±3.4 kg with 68.1±5.6 cm and 25.2±3.4 kg with 71.0±3.8 cm; 113.5±21.6 kg with 100.4±29.2 cm and 126.4±30.7 kg with 104.2±6.1 cm; 140.8±33.0 kg and 105.1±7.3 cm with 157.1±28.1 kg and 107.4±6.3 cm; 206.6±46.7 kg and 117.4±5.1 cm with 227.4±36.3 kg and 128.5±7.8 cm; 252.3±51.2 kg and 130.6±2.7 cm with 274.8±31.9 kg and 131.6±3.8 cm respectively. While SNP results showed there are four major types of nucleotide acid sequences, i.e. 68.3% ACGTCGG; 10.0% ACGATCG; 6.7% ATGCCGG and 6.7% ATGTCGG from population. It was concluded that F3<sup>th</sup> performance of new breed OC *Agrinak* cattle was better than its F2<sup>th</sup>, and has four major sequences of SNP in its HG891 gene.

**Keywords:** Phenotypic, Genotypic, F2<sup>th</sup>, F3<sup>th</sup>, OC Cattle.

### INTRODUCTION

Beef Cattle Research Station (BCReS) as one of Technical service unit at Indonesian Agency for Agricultural Research Development (IAARD), since 2002 has duty and function as exploring, preserving and developing of Ongole Crossed (OC) cattle, through OC cattle breeding activities using *Low External Input Sustainable Agriculture* (LEISA), with aim to producing the selected OC cattle that have high genetic flexibility for the low quality feed. Compared with the early efforts of breeding in 2002-2003, research results of BCReS in 2013 to 2015 have shown average body weight and hump high of selected OC bull candidates: 434.7 kg from 320.8 kg and 143.0 cm from 136.8 cm. Indonesian National Standard 2015 establishes the hump high of the first class OC bullock germ at 24 months old is 133 cm.

Application of LEISA pattern in BCReS is utilizing by-products of local agriculture and by-products processing of local agricultural production as feed ingredients, so feed contains low crude protein (CP) and high crude fiber (CF). In 2016, 14 years later, the young OC cattle in BCReS are the third (F3<sup>th</sup>) and the fourth (F4<sup>th</sup>) generation that born, growing and developing with those feeding conditions, so physical, chemical and microbiological condition of digestive tracts OC cattle in BCReS have adapted specifically to being able to digest and metabolize low-quality feed.

Agriculture Minister Regulation Number 54/Permentan/OT.140/10/2006 mentions that breed is an individual group of livestock in one clump (a group of livestock that have same of traits, external characteristics and offspring at one species) that are developed for breeding purposes and/or certain characteristics. Therefore, current young OC cattle (in 2016) who present in BCReS will be proposed to be defined as a new breed of OC cattle that specified capable to utilizing low protein and high fibrous feeds, so it remains adaptively cultivated in marginal areas. The objective of this research is to know phenotypic and genotypic performance of F2<sup>th</sup> and F3<sup>th</sup> new breed OC *Agrinak* cattle.

## MATERIALS AND METHODS

The study was conducted from 2011 to 2016, observing of phenotypic and genotypic performance cattle (from birth until became cow/bull) from 201 females and 28 males second generation (F2<sup>th</sup>) also 328 females and 29 males third generation (F3<sup>th</sup>) as parents who will produce the new breed OC *Agrinak* cattle.

Cattles are kept in experimental stall at BCReS, were given feed with low-quality (contains 8 to 9% CP, 22 to 26% CF, 85 to 87% OM and 53 to 55% TDN), as much as 3 to 4% from body weight cattle (dry matter basic); were arranged mating and were gradually selected, to produce new breed OC *Agrinak* cattle who have high genetic flexibility (able to adapted with low quality of feed, so can achieve hump high minimal 135 cm for candidate bull or 126 cm for cow candidate at 24 months old. In order to start getting SNP marker that related to body weight of new breed OC *Agrinak* cattle, were done *polymerase chain reaction* (PCR) and sequencing analysis were performed at Biomolecular Laboratory at Faculty of Animal Science, Gadjah Mada University.

Parameters observed : phenotypic performance, that were body weight and hump high cattle at birth, weaning, 12 and 24 months, also at first mating old; genotypic performance, that was SNP marker of growth gene GH891. Phenotypic data is calculated on its average and deviation value; while genotypic data is processed using *Bioedit* program, then was presented descriptively.

## RESULT AND DISCUSSION

**Phenotypic Performance.** The results of body weight and hump high of cattle from birth up to about 24 months old, its data are listed in Table 1. It appears that average of body weight and hump high of parents, especially if F3<sup>th</sup> were compared with F2<sup>th</sup>, cattles that will produce new breed OC *Agrinak* cattle has been above from average OC cattle at farmers. This condition was suspected as result of selection and mating arrangement, where only cattle that have body weight and hump high that above from average population (as an expression of genetic flexibility potential cattle towards low quality feed), that were selected and then were arranged mating in order to get the next offspring who were better than its parents.

**Genotypic Performance.** The PCR analysis that was followed by sequencing analysis of the growth gene GH891 cattle, its results are presented in Figure 1. It appears that when compared to the non-candidate of new breed OC who present in farmers, there are specific differences in specific of SNP markers on OC cattle that have been established as producer of new breed OC *Agrinak* cattle candidate. Nucleotide acids configuration of SNP markers at OC cattle that initially there are only three types, at parents as producer of new breed OC *Agrinak* cattle candidate has changed to 8 types and happened loss one SNP marker configuration (from 3.6% to 0.0%), that is ATATCGG. Compared with non new breed OC *Agrinak* cattle candidate, the parents as producer of new breed OC *Agrinak* cattle candidate still have the highest of frequency SNP markers configuration ACGTCGG, although it has decreased (from 82.1% to 68.3%); while six new nucleotide acid configurations, its frequency of occurrence ranging from 1.7 to 10.0%. This changed or differentiated in SNP markers that happen in the parents as producer of new breed OC *Agrinak* cattle candidate, although not yet fully known for their effect on its cattle growth, but it has characterized specific genotypic performance for new breed OC cattle and it was different from characteristics of genotypic performance with characteristics genotypic at non-candidate of new breed OC cattle.

**Table 1.** Penotypic performance of OC cattle

		birth	Weaning	12 month	First mating	>24 month
Body weight (kg)	F2 <sup>th</sup>	24.8±3.4	113.5±21.6	206.6±46.7	252.3±51.2	377.6 ±35,4
	F3 <sup>th</sup>	25.2±3.4	126.4±30.7	227.4±36.3	274.8±31.9	384.4 ±22,1
	Frm*	11.6±3.4 <sup>1</sup>	106.5±24.2 <sup>1</sup>	--	--	289.7±65.9 <sup>4</sup>
		11.1±3.9 <sup>2</sup>	107.7±33.7 <sup>2</sup>	--	--	--
Withers height (cm)	F2 <sup>th</sup>	68.1±5.6	100.4±29.2	105.1± 7.3	130.6± 2.7	131.9 ± 3,6
	F3 <sup>th</sup>	71.0±3.8	104.2± 6.1	107.4± 6.3	131.6± 3.8	133.7 ± 4,1
	Frm*	73.7±3.6 <sup>1</sup>	98.3± 9.4 <sup>1</sup>	--	--	121.6± 4.4 <sup>3</sup>
		--	98.5±10.1 <sup>2</sup>	--	--	126.9± 6.6 <sup>4</sup>
	INS**	--	--	--	--	128 – 133

Note : \* = at farmer

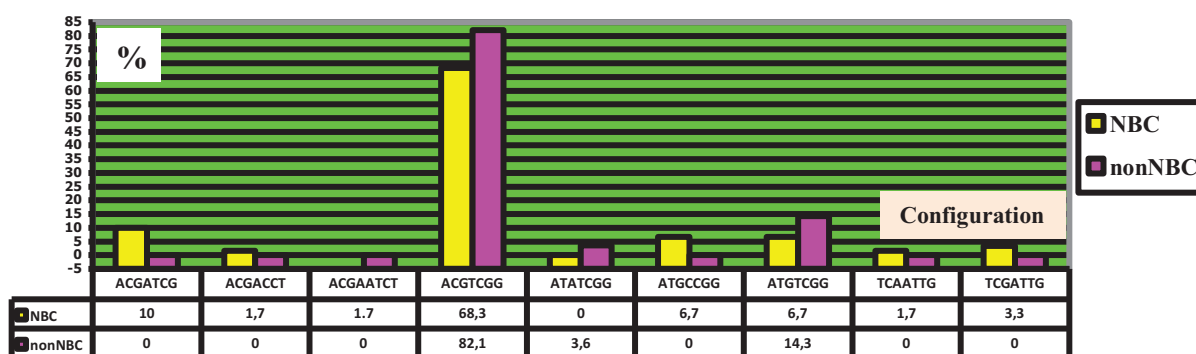
= <sup>1</sup> Ferdianto et al. (2013)

= <sup>2</sup> Supartini and Darmawan (2014)

= <sup>3</sup> Trifera et al. (2011)

= <sup>4</sup> Hartati et al. (2010)

: \*\* = Indonesia National Standard (2015)



Note : NBC = New Breed Candidate

**Figure 1.** Major types of OC cattle nucleotide acid sequences

## CONCLUSIONS

Compared with cattle as producer candidate of new breed OC *Agrinak* cattle, there has formed of phenotypic performance and genotypic of growth genes GH891 that different and specific at parents (F2<sup>th</sup> dan F3<sup>th</sup>) of producer new breed OC *Agrinak* cattle candidate.

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