

## Conference Paper

# Performance of Dairy Cows in Late Lactation Period Receiving Heit Chrose Feed Supplement

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**ORCID**<https://orcid.org/0000-0002-0920-657X>**Abstract.**

The objective was to evaluate Heit Chrose (HC) as a feed supplement for dairy cows, which was measured through digestibility, milk production, milk components and body conditions scores. The research was conducted at UPTD Pagerkukuh Wonosobo using 21 dairy cows in late lactation period (12 cows in 2<sup>nd</sup> lactation and 9 cows in 4<sup>th</sup> lactation). The diet provided contained 10.1% crude protein and 60.5% total digestible nutrients. The experimental study was conducted with a nested design. The treatments given were R0: control feed + 0 HC, R1: control feed + 1% HC and R2: control feed + 2% HC. The results showed that HC supplementation did not affect feed consumption but increased the dry matter (DM) and organic matter (OM) digestibility. The HC supplement increased milk production in both 2<sup>nd</sup> and 4<sup>th</sup> lactations and increased total solid in 2<sup>nd</sup> lactation. However, the total solid in 4<sup>th</sup> lactation decreased due to HC supplementation. In other milk components (fat, protein and SNF) HC supplementation created no significant effect. The conclusion of this research is that supplementing HC at the level of 1% in dairy cows feed during late lactation period can increase total solid in 2<sup>nd</sup> lactations and tend milk production.

**Keywords:** Late lactation, Heit Chrose, Dairy Cows

## 1. Introduction

Dairy cattle nutrient intake in Indonesia tends to be insufficient the nutrient needs of livestock, whoever the average milk production is low. Therefore it is necessary to add additional feed supplements that can increase feed consumption and milk production performance. The Heit-Chrose is one of feed supplement products derived from garlic extract which contains allisin, saponins and organic minerals (Se, Cr and Zn). Saponins and alliscins contained in Heit-Chrose are able to increase propionate production and reduce methane gas production which is a result of carbohydrate fermentation [4]. The addition of Cr can increase the use of glucose in the body, while the Se given in feed will be able to cell protected of oxidative damage during metabolism and Zn-lysiant will increase metabolism proces. Based on this, it is necessary to study how much influence and the optimal level of feeding Heit-Chrose supplements on feed intake and

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digestibility as well as milk production and quality. The average peak of milk production in Indonesia occurs in the 5-6th week after parturition, after which milk production will gradually decline. In this study, feed supplements were able to stimulate milk production after the peak production was passed.

## 2. Material and Methods

The materials were used for the study were twentyone lactating Frisien Holstein dairy cows at 2<sup>nd</sup> and 4<sup>th</sup> lactation of month 5<sup>th</sup>. The treatment were forage (elephant grass) and concentrate with a ratio of 60: 40% and feed supplement with Heit-Chrose levels, each treatment, namely 0%, 1% and 2% (Showned in Table 1 and 2). Feed was given 3 percent of the cow's body weight.

All procedures were performed according to the guiding principles for the care and use of research

animals and were approved by Animal Science Faculty of Jenderal Soedirman University.

TABLE 1: Chemical Composition of Forages, Concentrates and Heit-Chrose feed supplements.

Feedstuff	% DM	Ash	CP	EE	CF	BeTN	TDN
			---- %DM ----				
Elephant grass	22	15.9	11.5	3.2	29.3	40.1	64.24
Concentrats	85.14	13.26	13.77	3.78	17.41	37.95	61.63
Heit-Chrose	93.23	48.75	3.71	0.88	0.56	39.32	44.71

TABLE 2: Nutrient composition of feed treatment.

Treatments	%DM	Ash	CP	EE	CF	BETN	TDN
				---- % DM ----			
R0	47.25	14.24	9.34	2.21	23.65	31.40	63.20
R1	48.19	14.72	9.37	2.22	23.66	31.79	63.65
R2	49.12	15.21	9.41	2.23	23.66	32.19	64.09

The variables observed were feed consumption, feed digestibility, milk production and quality. Milk production was recorded every day for 30 days after the preliminary period. The feed was given based on dry matter intake data obtained in the preliminary period ( 30 days). The feed was given was weighed, if there was refusal it was also weighed in order to obtain feed consumption data. The refusal was weighed the next

day before feeding and samples were taken (approximately 10%) every day and dried in an oven at 105 ° C for 8 hours for 5 consecutive days.

At the last of the study, the feed samples and the refusal samples were proportionally composited per head. The research method used was experimental using a nested classification design with four replications in group A (lactation 2) and three replications in group B (lactation 4). Research location: Satker Pager Kuku Wonosobo, belonging to the Livestock Service Office of Central Java Province.

### 3. Results and Discussion

#### 3.1. Daily feed intake

The results showed that adding of feed supplement feed in dairy cattle feed had no significant effect ( $P \geq 0.05$ ) on feed intake. The average feed intake shown in table 3.

TABLE 3: Average of feed intake dan feed digestibility.

Treatment	Group	Feed intake (kg/d)		Digestibility	
				DMD (%)	OMD(%)
R0 R1 R2	A (lactation 2 <sup>nd</sup> )	13.52	+ 1.26	61.85±5.45 <sup>a</sup>	59.90 ± 6.94 <sup>a</sup>
		13.65	+ 1.14	66.24±6.79 <sup>b</sup>	63.04 ± 6.64 <sup>b</sup>
		13.50	+ 2,43	71.23±4.81 <sup>c</sup>	68.50 ± 5.37 <sup>c</sup>
R0 R1 R2	B (lactation 4 <sup>th</sup> )	12.18	+ 1,83	62.63±6,78 <sup>a</sup>	60.32 ± 7.15 <sup>a</sup>
		11.52	+ 0.95	64.54±2,46 <sup>b</sup>	61. 60 ± 3.86 <sup>a</sup>
		11.55	+ 0.88	67.44±2,50 <sup>c</sup>	66.15 ± 1,77 <sup>b</sup>

DMD : Digestibility of dry matter, OMD : organic matter of digestibility

The average of feed intake of group A was 13.56 ± 1.61 kg and the average DM consumption of group B was 11.75 ± 1.22 kg. the DM needs of the lactation group A were R0 with average body weight 464 kg was 13.9 kg, R1 with average body weight 506.6 kg was 15.2 kg, R2 with average body weight 524.5 kg was 15.7 kg, and from lactation group B, R0 with average body weight 464.8 kg was 13 , 9 kg, R1 3% with average body weight 389.9 kg ± 11.7 kg, R2 with average body weight 407.4 kg was 12.2 kg. All treatments received feed according to the NRC standard [3]. DM consumption was influenced by several factors, namely body weight, level of milk production, and quality of feed ingredients [4, 5], it is further explained that, one of the factors affecting consumption is the quality of feed, good quality feed has a relatively high level of consumption compared to quality feed low. From the three treatments, it showed that the consumption of DM in A and B in repetitions of R0, R1 and R2 decreased, in repetitions

of R0 the consumption of DM was 12.95 kg in replications R1 the consumption of DM was 12.74 kg and in tests R2 consumption of DM was 12.67 kg.

### 3.2. The digestibility of dry matter

The process of digestion of feed in ruminants is carried out by microbes. The rumen requires an optimum condition where the number of bacteria and protozoa is balanced so that fermentation in the rumen is efficient. Research on the addition of Heit-Chrose feed supplements to dairy cattle feed on dry matter digestibility presented in Table 3. The dry matter digestibility in lactation 2<sup>nd</sup>, respectively, namely R0, R1 and R2 were 59.90%, 63.04% and 68.50%. In lactation 4<sup>th</sup>, the dry matter digestibility values were 60.32%, 61.60% and 66.15%, respectively. The results of this study inline with other studies [3]. The highest dry matter digestibility value in lactating dairy cows 2 and lactating dairy cows 4 was treatment R2. These results indicated that HC supplementation was able to increase rumen microbial activity. The addition of Heit-Chrose feed supplements showed a significant effect on the digestibility of dry matter and organic matter, this is thought to be the presence of saponins and allisins in Heit-Chrose. Saponins as defaunation agents are able to suppress the growth of rumen protozoa optimally, while allisin compounds are able to suppress methanogenic populations [4].

### 3.3. The digestibility of organic matter

The digestibility values of the 2 lactating dairy cows, namely R0, R1 and R2 were 61.85%, 66.24% and 71.23%, respectively. In lactation 4, the digestibility values of organic matter, namely R0, R1 and R2, were 62.63%, 64.54% and 67.44%, respectively. The highest organic matter digestibility value in lactating dairy cows 2 and lactating dairy cows 4 was treatment R2.

### 3.4. Milk Production

The results showed that the average production of FH cow's milk based on period 2 / A in R0 was  $5.94 \pm 1166$  kg, R1 was  $6.80 \pm 0.460$  kg and R2 was  $6.73 \pm 0.388$  kg and period 4, R0 was  $6.52 \pm 1.113$  kg, R1 was  $6.87 \pm 0.988$  kg and R2 was  $7.29 \pm 0.867$  kg/day/head. The results of this study indicate that the basal feed insufficient of feed its need of dairy cows both in quality and quantity milk, therefor milk production is low. In the treated feed there was an increase in milk production but did not increase optimally,

it is suspected that the supplement feed was unable to stimulate the development of mammary gland cells at the end of the lactation period. The results of this study showed that limited feed energy and protein greatly affect milk production, both in lactation of 2<sup>nd</sup> or 4<sup>th</sup>, resulting in low milk production [10]

TABLE 4: Milk production and components.

Variables	Laction- 2 <sup>nd</sup>			Lactation- 4 <sup>th</sup>		
	R0	R1	R2	R0	R1	R2
Milk Production (kg/day)	5.94±1.17	6.52±1.11	6.80±0.46	6.87±0.99	6.73±0.39	7.09±0.87
Milk Component (%)						
Fat	5.20±0.22	4.19±0.19	5.29±0.21	5.05±0.23	4.66±0.18	4.62±0.20
Protein	2.53±0.13	2.55±0.17	2.49±0.14	2.49±0.17	2.47±0.10	2.50±0.11
Lactose	4.20±0.20 <sup>ab</sup>	4.27±0.24 <sup>ab</sup>	4.26±0.12 <sup>ab</sup>	4.28±0.27 <sup>ab</sup>	3.87±0.15 <sup>ac</sup>	3.95±0.16 <sup>bc</sup>
Total solids	11.91±0.40 <sup>ab</sup>	10.81±0.61 <sup>ab</sup>	12.16±1.15 <sup>ac</sup>	11.13±0.31 <sup>bc</sup>	12.09±0.85 <sup>ab</sup>	11.23±0.5 <sup>ab</sup>
Solid Non Fat	6.86±0.15	6.90±0.24	6.70±0.13	6.70±0.22	6.51±0.14	6.70±0.17

### 3.5. Total Solid

The mean of Total Solid (Table 4) the results of this study are considered high in accordance with SNI (2011) which implies that the standard of Total Solid for cow's milk in Indonesia is 11.3%. Total solid is a component of milk which consists of fat content and solid non fat. Fat content and solid non fat are influenced by crude fiber consumed by livestock. The results showed that the feed supplement heit chrose had a very significant effect on the levels of total solid ( $P < 0.01$ ). The total solid is influenced by the lactation period. In addition, the mineral Cr also plays a role in protein metabolism, especially the incorporation of amino acids [1]. Therefore, the addition of Heit Chrose can increase milk protein synthesis so that the total solid was increases, because the total solid consists of protein, fat, lactose, vitamins and minerals.

### 3.6. Solid Non Fat

The results of the average value of solid non-fat research with treatment R0, R1 and R2 are listed in table 3. The average solid non fat (Table 3) the results of this study are low and below the SNI standard (2011) of 7.8%. This is presumably due to the small milk protein content and large fat during the study. The high milk protein content will

increase the non-fat solid value, while the high fat will decrease the non-fat solid value [6].

### 3.7. Milk Protein

Protein content of milk is one of the parameters determining the quality of fresh milk for dairy cows. The results showed that the addition of HC had no effect on milk protein content. The lowest average protein content was found in group B which received R1 treatment (1% addition of Heit-Chrose feed supplement), while the highest average was in group A who received R1 treatment (1% addition of Heit-Chrose feed supplement). The milk protein content was carried out using a Lactoscan, resulting in the average milk protein content for group A was  $2.527 + 0.101\%$  and the protein content for group B was  $2.476 + 0.164\%$ . When viewed from the average value of each group, it can be categorized as low quality because the value is below the standard set by SNI (2011), namely milk protein content, namely 2.80%.

The results showed that the average group A (2<sup>nd</sup> lactation) for R1 (addition of 1% Heit-Chrose feed supplement) was  $2.56 + 0.101\%$ , this figure was greater than R2 (addition of Heit-Chrose feed supplement), namely  $2.49 + 0.101\%$ . Whereas in group B (4<sup>th</sup> lactation) the R2 was  $2.48 + 0.164\%$ , this figure was greater than R1 which was  $2.48 + 0.164\%$ .

The difference in lactation group is thought not to affect milk protein content, milk protein content is influenced by the month of lactation. This is in accordance with the opinion of [9], that the percentage of milk fat clearly decreases during the first 2-3 months of lactation, then increases in line with the decrease in milk production. The protein content of milk regularly increases according to the month of lactation. From this mechanism, it can be concluded that the protein content is not influenced by the level of lactation but there is an increase in protein levels during the month of lactation [9].

### 3.8. Milk fat

The results showed that the addition of feed supplements had no significant effect ( $P > 0.05$ ) on milk fat content. The addition of feed supplements in group A (lactation 2) resulted in an increase in the value of milk fat content from 5.05% (R0) to 5.39% (R2), while for group B resulted in a decrease in milk fat from 5.68% (R0) to 4.52% (R2). Feed supplement is given as much as 1-2% of the total dry matter requirement. The levels of fat, protein and lactose in this study were lower than that of other researchers [7, 8]

## 4. Conclusions

The conclusion of this research is that supplementing HC at the level of 1% in dairy cows feed at late lactation period can increase total solid in 2<sup>nd</sup> lactations and tend milk production.

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