Using fibrolite enzymes to reduce effect of heat stress on Holstein dairy cows

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INTRODUCTION

Climate in Egypt is classified as subtropical climate; it is hot and arid for at least eight months in the year (Shawky *et al.*, 1996).

Holstein Friesian cow are suffered from heat stress in Egypt, because it is not adapted to the local environmental conditions (high temperature and humidity).

Heat stress occurs when an animal heat load is greater than its capacity to loss heat. The animal reacts with heat stress by several physiological changes include:

*** Increase of body temperature**
*** Increased respiration rate**
*** Increased water consumption**
*** Decreased feed intake**
*** Slow rate of feed passage**
*** Slow blood flow to internal organs**
*** Altered endocrine secretions**
*** Depression in productive and reproductive performances**

There are many means to reduce effect of heat stress; adding exogenous enzymes to diet is a one of this means,

it increases enzymatic activity in the rumen, which enhance digestibility of the diet .

OBJECTIVE

This study aimed to investigate the effect of adding fibrolytic enzyme (Fibrozyme) as a nutritional manipulation to reduce effect of heat stress on lactating Holstein cow performance.

MATERIALS AND METHODS

Experimental animals:

*** Ninety-two Holstein Friesian dairy cow weight 523.5 Kg in average.**

*** Animals were divided into two groups:**

- **Control group (N=46).**
- **Fibrozyme group (N=46).**

Experimental ration:

Cows in two groups were fed a total mixed ration (as show in Table 1) without or with 15 g Fibrozyme

Table 1: Experimental ration composition

Ingredient	Content, %
Alfalfa hay	10.25
Corn silage	18.61
Alfalfa	12.40
Sunflower meal	5.70
Linseed meal	5.66
Gluten meal 60	2.60
Soybean meal 44%	16.37
Yellow corn	23.66
Lime stone	0.74
Vitamins mixture	0.17
Minerals mixture	0.08
Protected fat(Magnapac)	2.81
Sodium bicarbonate	0.74
Calcium diphosphat	0.21

Table 2: Nutrient evaluation of experimental ration

Nutrient	Content, %
DM	65.88
CP	17.80
CF	14.00
NDF	29.37
ADF	20.51
Calcium	1.42
Phosphorus	0.42
TDN	75
NE_L	1.72, Mcal/Kg

Feeding and management:

- Cows were fed on TMR:

1) Without Fibrozyme supplement (control group).

2) With 15 g Fibrozyme /head/day (Fibrozyme group).

- Fibrozyme is enzyme blend prepared from fermentation extract and fermentation solubles of *Aspergillus Niger* and *Trichoderma longibarachiatum*, having xylanase activity min.100 XU/g, Alltech product.

- Animals were fed to cover nutrients requirements according to recommendations of NRC (2001).

- Cows were milked three times daily at 4 a.m., 12 p.m. and 8 p.m. in a Dobell 16-parallel milking parlor equipped with automatic cow identification, milk recording system, and automated detacher milker units.

Technical assessments:

*Experimental conditions:

-Ambient temperatures and relative humidity were recorded three times every day at 7 a.m., 3 p.m. and 11 p.m. and were 35 ^{o}C and 54% in average, respectively.

*Physiological response:

The physiological response activities were assessed by thermo-respiratory response, change in trend of fluctuations in the concentration of blood serum metabolites and hormones.

- Body temperature:

Rectal temperature was measured between 8 and 9 h. before feeding by clinical thermometer inserted into the rectum for two minutes.

- Respiration rate:

Respiration rate (breath/min.) was counted from the movements of the flank in one minute.

*Milk yield and composition:

- Milk yield for all cows were individually recorded daily.

- Milk samples were taken to determine fat, protein and lactose content.

*Blood constituents:

- Blood samples were taken before morning feeding from Jugular vein from each animal.

- Serum was separated and used to determine some blood parameters.

*Statistical analysis:

Data were analyzed using SAS (1999) using ANOVA one way analysis according to the following model:

$$Yij = \mu + T_i + E_{ij}$$

RESULTS

Table 3: Rectal temperature and respiration rate of lactating cows

Parameter	Experimental groups		Sig.
	Control	Fibrozyme	
Rectal temperature, °C	40.4	40.2	NS
Respiration rate, Breath/minute	82	81	NS

Table 4: Feed intake of lactating cows

Nutrient, Kg/h/day	Experimental groups		Sig.
	Control	Fibrozyme	
DM	23.69	23.95	NS
TDN	17.77	17.96	NS
NE_L	40.75	41.19	NS
CP	4.22	4.26	NS

Table 5: Milk yield of lactating cows

Component, Kg	Experimental groups		Sig.
	Control	Fibrozyme	
Milk yield	26.040	29.370	*
FCM yield	23.400	28.670	*
Total solids yield	3.091	3.665	*
Fat yield	0.865	1.128	*
Protein yield	0.792	0.916	NS
Lactose yield	1.289	1.471	NS
Solid not fat yield	2.226	2.538	NS

Table 6: Effect of fibrozyme supplement on milk composition

Component,%	Experimental groups		Sig.
	Control	Fibrozyme	
Total solids	11.87	12.48	NS
Fat	3.32	3.84	*
Protein	3.04	3.12	NS
Lactose	4.95	5.01	NS
Solid not fat	8.55	8.64	NS
Ash	0.56	0.51	NS

Table 7: Effect of Fibrozyme supplement on feed conversion

Item	Experimental groups		Sig.
	Control	Fibrozyme	
Feed conversion, Kg feed/Kg milk			
DM	0.909	0.815	NS
CP	0.173	0.153	NS
TDN	0.561	0.503	NS
NE_L	1.453	1.296	NS
Feed conversion, Kg feed/Kg FCM			
DM	1.012	0.835	*
CP	0.193	0.157	*
TDN	0.624	0.515	*
NE_L	1.609	1.328	*

Table 8:Effect of Fibrozyme supplement on some blood constituents

Parameter	Experimental groups		Sig.
	Control	Fibrozyme	
Total protein, g/dl	7.20	7.55	*
Albumin, g/dl	3.78	3.81	NS
Globulin, g/dl	3.42	3.74	NS
A/G ratio	1.10	1.01	NS
Glucose, mg/dl	51.48	58.55	*
T3, ng/dl	64.88	78.60	*
ALT, u/l	52.75	54.13	NS
AST, u/l	42.75	46.63	NS
Alkaline phosphatase, u/l	20.85	26.64	NS
Total belirubin, mg/dl	0.158	0.220	*
Urea, mg/dl	48.12	54.57	NS

CONCLUSION

It is concluded that fibrolytic enzymes (Fibrozyme) supplement:

*** Increased milk yield.**

*** Increased fat % and yield and total solids yield.**

*** Improved feed conversion.**

*** Maintenance the physiological status for dairy cow.**

Thank You

For Your Attention