

قسم : الميكروبيولوجيا وصحة الحيوان .
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تأثير بعض الظروف البيئية على انتاج اللبن وبعض مكوناته في مزارع الألبان

ابراهيم شحاته ، حامد سماحة

لوحظ أن لدرجة الحرارة والرطوبة النسبية خلال مواسم السنة لها تأثير معنوي على انتاج اللبن ، وأن لارتفاع درجة الحرارة ونسبة الرطوبة تأثير مضاد لانتاج اللبن ومكوناته .

كانت درجة الحرارة والرطوبة النسبية في الحظائر المقفلة 22.45 ± 3.9 م ،
 70.74 ± 8.9 % على الترتيب . أما في الحظائر المفتوحة فكانت
 23.85 ± 2.9 م ، 74.35 ± 7.4 % على الترتيب .

وجد أن متوسط ادرار اللبن في الصيف والشتاء كان 2128.64 ± 1400.54 ،
 3637.2 ± 1145 كجم على الترتيب ، بينما كان متوسط نسبة الدهن
 3.86 ± 0.26 ، 3.57 ± 0.28 % في نفس الفصليين من السنة على الترتيب ، ومن
ناحية أخرى كانت نسبة المواد الصلبة في اللبن 12.52 ± 0.48 ، 12.35 ± 0.51 .
في الشتاء والصيف على الترتيب .

رأبوتها خمس أمتار
تسبب بظلالها كالمسحوق
لونها كالمسحوق

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**THE EFFECT OF SOME ENVIRONMENTAL CONDITIONS
ON MILK YIELD AND ITS CONSTITUENT IN DAIRY FARMS**
(With 3 Tables)

By
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SUMMARY

The authors studied the climatic conditions under which dairy animals at Behera, Alexandria and Kafr El-Sheikh Provinces were managed. The results showed that the temperature and relative humidity had an influence on the milk yield of the animals. Increase in both temperature degree and humidity percentage mainly affects the constituents.

Temperature degree and humidity percentage in closed stables were 22.45 ± 1.3 , 70.47 ± 8.5 and 23.85 ± 2.9 , 74.35 ± 7.4 for indoors and outdoors respectively.

The average milk yields in summer and winter were 212.64 ± 1400 and 2637.3 ± 1145 Kg respectively. The average fat percent in the respective two seasons was 3.57 ± 0.28 and 3.86 ± 0.26 . At the same time total solids were 12.35 ± 0.51 and 12.52 ± 0.48 in summer and winter respectively.

INTRODUCTION

Structures for livestock have the basic function of climatic modification. Protection from extreme hot, humid and cold atmospheres is necessary for animal health and production, since they can upset the metabolic processes.

The effect of temperature and relative humidity on the performance of dairy cattle and milk constituents were studied by many investigators (RENHER, 1976; SASTRY and THOMAS, 1976; BESHIN and ANOJCIC, 1979; DRAGOVICH, 1979; MALCOLM and POUL, 1979; CLARENCE, *et al.* 1980; MEISCKE, *et al.* 1979; RADADIA, 1979; SAINSBURY and SAINSBURY, 1979; HUTH, *et al.* 1980 and PASCHKE, 1982.

The present investigation was done to show the effect of climatic conditions on milk yield and its major constituents.

Part of a thesis submitted at Fac. of Vet. Med. Alex. Univ. for partial fulfilment of the master degree in Animal husbandry.

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MATERIAL and METHODS

Ten Governmental dairy farms located in Alexandria Province (3 farms), Behera Province (6 farms) and Kafer El-Sheikh Province (one farm) were investigated from the view of micro-climatic condition and its effect on milk yield and its constituents.

1- Micro-climatic conditions:

a- Air temperature:

Ambient temp. were recorded inside the investigated building by using a maximum and minimum thermometer placed at a distance of few inches from the floor level of each enclosure.

b- Relative humidity:

R.H. % inside each animal stable were recorded by using the hair hygrometer.

Several reading of temperature and relative humidity percentage were recorded at different times and the average was calculated for each season.

3- Milk constituents:

Butter fat percentage, total solid and solid not fat were determined according to A.O.A.C (1975).

RESULTS

Climatic is a combination of several elements, the most important of which are the prevailing temperature and the moisture content. Animal husbandry is affected by climatic conditions in two ways, first through the direct influence on animal and secondly by the indirect effect on its environment.

Table (1)
The relationship between variation in environmental temperature, relative humidity and milk yield

System of	Temperature (°C)	Relative humidity (%)	Milk yield (Kg)
Indoors	22.45 ± 1.3	70.47 ± 8.5	2919.5 ± 723.9
Outdoors	23.85 ± 2.9	74.35 ± 7.4	2239 ± 249.7

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Table (2)
Seasonal variation between air temperature, relative humidity, milk yield and its major constituents

Season	Temperature (°C)	Relative humidity (%)	Milk yield	Milk constituents		
				Fat %	S.NF%	T.S %
Winter	18.1 ± 2.7	66.4 ± 6.6	2637.3 ± 1145.1	3.86 ± 0.26	8.86 ± 0.22	12.52 ± 0.48
Summer	28.2 ± 1.4	78.4 ± 4.7	2127.46 ± 1400.54	3.57 ± 0.28	8.68 ± 0.23	12.35 ± 0.51

Table (3)
Diurnal Variation in air temperature, relative humidity and milk yield in winter and summer

Variables	Air temperature (°C)				R.H (%)				Daily milk yield			
	Indoors		Outdoors		Indoors		Outdoors		Indoors		Outdoors	
	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter
Mean	27.5	17.4	28.9	18.8	75.8	65.14	81	67.7	9.36	12.2	7.98	10.37
S.D.	0.81	1.7	2.06	3.7	3.12	14.7	6.2	8.85	1.65	1.9	1.31	2.03
C.V	3	9.8	7	19.7	4	22.6	7	12.5	7.89	15.8	7.26	19.6

S.D. = Standard deviation

C.V = Coefficient of Variation

DISCUSSION

It has been found that the average air temperature recorded during the period of investigation varied between 22.45 ± 1.3 and 23.85 ± 2.9 °C (Table 1) which lie within the comfort zone of dairy cattle reported by BARRET and LARKIN (1977) and SAINSBURY and SAINSBURY (1979). Moreover, RENNER, *et al.* (1976), BASLIN and ANOJCIC (1979) and PASCHKE (1982) recorded nearly similar temperatures in dairy cattle byres. However much higher ambient temperatures were reported by DONALD, *et al.* (1978) and LANGE (1978). It has been found that too high air temperatures above 27°C in case of temperate type cattle, the thermoregulative mechanism begin to fail resulting in a number of harmful complications to animal health and production.

Many field studies have given more detailed information on the effect of air temperature on milk, butter fat, solids not fat and total solids production. With an increased ambient temperature, the appetite is depressed, food intake is reduced and heat production correspondingly lowered, which can lead to a decrease in productivity. These phenomena partly explain the variation in milk yield noticed in the present investigation (Table 2 and 3).

It can be recognized from the results presented in Table (3) that the daily milk yield was substantially reduced during summer when the environment temperature reached its maximum level (28.9 ± 2.06 °C). Similar findings were previously reviewed by MIESCKE, *et al.* (1979). Moreover, a decrease of 2.84 Kg in milk production was recorded in cows kept in enclosed housing systems following an elevation of air temperatures from 17.4 to 27.5°C, while the increase in outdoor ambient temperatures from 18.8°C to 28.9°C resulted in a reduction of 2.39 Kg in milk production (Table 3). These findings are in agreement with those recorded by SASTARY and THOMAS (1976), DONALD, *et al.* (1978), LANGE (1978) and PASCHKE (1982) however DRAGOVICH (1979) has reported the reverse.

The data presented in Table (1) revealed a negative correlation between relative humidity and milk yield. The humidity percentage determined in indoors and outdoors dwelling were found to be 70.47 ± 8.5 and 74.35 ± 7.4 respectively.

The moisture content of the air has a pronounced effect on health and production of animals since it influences the important channels of extraction of surplus body heat. It would be responsible therefor to suppose that has some effect on food intake and consequently production. These results are in agreement with those of RENNER (1976) and DONALD, *et al.* (1978) however, a contradictory opinion was reported by DRAGOVICH (1979).

It can be noticed from Table (2) that the increase of both air temperatures and relative humidities resulted in a decrease of the percentages of butter fat, total solids and solids-not fat. These results support those demonstrated by SASTRY and THOMAS (1976) and SAINSBURY and SAINSBURY (1979).

It seems clear therefore from the abovementioned investigations and supporting arguments, that the relative contribution of the major component of climatic conditions that demanded our particular attention. The environment must be optimized to develop potential of confined animals through ventilation, protection against extreme weather, excessive watering, concentrated rations and methods of husbandry. In general, changes in animals husbandry through good management of livestock can probably facilitate acclimatization and physiological adaptation for benefit of animal health and productive performance. Moreover, warm weather prevailing during winter was found to be advantageous than hot weather existing in summer for high milk yield.

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