UNIVERSITI PUTRA MALAYSIA

EFFECT OF DEXAMETHASONE (DEXADRESON) ON HAEMATOLOGICAL PARAMETERS OF GOATS

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ANIMAL INDUSTRY PAPER PRESENTED TO THE FACULTY OF VETERINARY MEDICINE AND ANIMAL SCIENCE UNIVERSITI PERTANIAN MALAYSIA AS A PARTIAL REQUIREMENT FOR THE FULFILMENT OF THE DEGREE OF DOCTOR OF VETERINARY MEDICINE (D.V.M)

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Teristimewa

Bonda Hajjah Murni dan tunangan tersayang

di atas sokongan moral serta semangat yang

diberikan.

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ABSTRACT

Experiments were carried out to study the acute and chronic effects of Dexadreson, a synthetic corticosteroid, on the haematological parameters in goats.

For the acute effect, blood samples were taken from the jugular vein of five female nonpregnant Jamnapari-Katjang crossbred goats at 0830, 0930, 1030, 1230, 1630 and 2030 hr. Dexadreson was administered i.v. at 0830 hr after blood sampling.

For the chronic effect, blood samples from the same goats were collected for seven days at 0830 and 1230 hr daily. Dexadreson was administered i.v. at 0830 hr daily after blood sampling.

The acute effects showed a pattern of neutrophilia and lymphopenia. Leucocytosis was observed and this is mainly attributed to the increase in neutrophils. Dexadreson treatment also caused monocytosis, eosinopenia and basopenia.

Values of total RBC, Total WBC, Hb , and plasma glucose concentration showed an increase while that of plasma protein concentration showed a decrease as a result of Dexadresson treatment.

The chronic effects of Dexadreson were observed to be similar to the acute effects.

ABSTRAK

Kajian-kajian dilakukan untok mengkaji kesan-kesan akut dan kronik hasilan dari suntikan Dexadreson, satu-satunya bahan sintetik kortikosteroid, ke atas parameter-parameter hematologi pada kambing.

Untok kesan akut, sampel-sampel darah diambil dari vena jugula lima ekor kambing betina kacukan Jamnapari-Kacang dan yang tidak bunting pada jam 0830, 0930, 1030, 1230, 1630 dan 2030. Suntikan Dexadreson dibuat dengan cara intravena pada jam 0830 selepas pengambilan darah dilakukan.

Untok kesan kronik, sampel-sampel darah diambil dari kambing-kambing yang sama selama tujuh hari berturut-turut pada jam 0830 dan 1230 setiap hari. Suntikan Dexadreson dibuat dengan cara intravena pada jam 0830 selepas pengambilan darah dilakukan.

Kesan-kesan akut menunjukkan corak nutrofilia dan limfopenia. Lekositosis juga dicerapkan dan ini disebabkan oleh peningkatan sel-sel nutrofil. Suntikan Dexadreson juga menyebabkan monositosis, esinopenia dan basopenia.

Nilai-nilai jumalah RBC, jumlah WBC, Hb dan kepekatan plasma glukos menunjukkan peningkatan sementara protin plasma menunjukkan penurunan akibat suntikan Dexadreson.

Kesan-kesan kronik didapati sama dengan kesan-kesan akut.

INTRODUCTION

The release of steriods from adrenal cortex in response to disease or stressful situations produces marked changes in the haematological parameters of the animals involved. There are several different adrenocortical hormones which exhibit glucocorticoid activity, but by far the most abundant is cortisol (also known as hydrocortisone). Other much less important glucocorticoids are corticosterone and cortisone. Under stressful conditions, nerve impulses will be elicited from the periphery into the hypothalamus which then secretes the corticotrophin-releasing factor. This secetion, which passes by way of hypothalamic-hypophyseal portal system into the anterior pitutary gland, subsequently causes the gland to secrete corticotrophin into blood circulation. This in turn stimulates the adrenal cortex to secrete corticosteroids.

The objectives of this experiment were :-

a) To study the acute effect of corticosteroids on haematological parameters in goats;

b) To study the chronic effect of corticosteroids on haematological parameters in goats;

c) To study the effect of corticosteroids on plasma glucose and protein concentrations in goats.

Dexadreson, a commercial dexamethasone preparation, was administered intravenously to mimic the effect of corticosteroids.

LITERATURE REVIEW

Schalm et al. (1975) reported that the release of steroids from the adrenal cortex in response to disease or stressful situations produced marked changes in the total number and differential distribution of circulating leucocytes.

Jasper and Jain (1965) demonstrated that in the pig, in addition to neutrophilia, lymphopenia and eosinophenia, a monocytosis resulted from administration of synthetic corticosteroids or ACTH.

The total red blood cell, total white blood cell and differential counts of WBCs in peripheral blood are influenced by the secretion of adrenocorticosteroids in the horse, cattle, dog, cat (Schalm et al., 1975) and in man (Guyton, 1976).

Adnan et al. (1985) reported that the haematological responses to ACTH treatment in pigs showed patterns of increased total RBC and WBC counts, Hb concentration and PCV. They also found that after ACTH treatment, the ratio of lymphocytes and neutrophils were reversed, resulting in lympophenia and neutrophilia.

Yates et al., (1956) reported that by decreasing the population of lymphocytes and plasma cells, and by interfering with the conversion of lymphocytes into antibody producing cells by phytohemagglutinin, the glucorticoids ultimately interfered with the immune response.

Selye (1936) noted that the patterns of responses to noxious agents included increased adrenocorticol secretion, and many of the signs of the response to noxious agents appeared to be

consequences of the high level of adrenocorticol activity which is designated as "General Adaptation Syndrome".

Burguez et al (1983) found that in horses treated with cortisol, the neutrophil/lymphocyte ratio was increased at 240 minutes (4.30 $\pm$ 0.88 from 1.40 $\pm$ 0.15) and at 8 hours (3.31 + 0.71) after injection. White blood cell and neutrophil counts were increased at 180 and 240 minutes and at 8 hour; the lymphoctes were decreased at 240 minutes. All the values returned to normal by 24 hour after injection.

MATERIALS AND METHODS

Animals

Five adult female nonpregnant Jamnapari-Kacang crossbred goats from Universiti Pertanian Malaysia Goat Unit were used. They were fed ad libitum with the grass Panicum maximum var. hamil and supplemented daily with 1/2 lb concentrate.

Experimental Design

Experiment 1

Normal blood samples (no treatment, control values) were taken by venipuncture of the left jugular vein at 0830, 0930, 1030, 1230, 1630 and 2030 hr. Each blood sample was divided into two portions; one containing EDTA, as an anticaogulant, and the other containing fluoride acetate for glucose and protein estimation.

To study the acute effect of corticosteroids on blood parameters, the goats was injected intravenously with 2.5 ml Dexadreson (Intervet International, Holland), a synthetic corticosteroid preparation, at 0830 hr immediately after blood sampling three days after sampling for the normal blood values. The same experimental protocol was followed for the time of collection of the blood samples.

Experiment 2

To study the chronic effect of corticosteroids on

with

2.5 ml Dexadresson daily for 7 days successively 2 weeks after experiment 1. Blood samples were collected at 0830 hr, immediately after the administration of Dexadresson, and 1230 hr daily for the same period.

Hematological analyses.

Haematological analyses were done according to the procedures described by Schalm et al. (1975). Total red blood cell (RBC) and white blood cell (WBC) counts were determined using hemocytometer chamber. Hemoglobin (Hb) concentrations were determined using a haemoglobinometer; packed cell volumes (PCV) were determined by the microhematocrit method and differential WBC count were performed on Wright's-Leishman stained blood films. Glucose and protein concentrations were determined using a photorefractometer (model 208, Bellington and Stanley Ltd., England).

Statistical Analyses

The parameters were submitted and tested for significance by the Least Significant Difference (LSD) test (Steel and Torrie, 1980).

RESULTS AND DISCUSSIONS

The haematological parameters on normal (no treatment) day showed variations beween hours of sampling (Figs.1,2 &3). The total WBC count showed the lowest value at 1230 hr as compared to the other sampling times. This was due principally to the decrease in neutrophils and lymphocytes which paralled the changes in the WBCs. The neutrophils showed the highest value at 1030 hr. Throughout the sampling the neutrophils were always higher than the lymphocytes. The monocytes and eosinophils only showed slight variation between sampling times while basophils were absent. Total RBC count, Hb concentration, PCV, protein and glucose concentrations were highest at 0830 hr than any other sampling times. The values observed in this study for the nontreated samples agree with those reported by Rasedee (1980).

On Dexadreson-treated day the observed leucocytosis (Fig.4) at 1630 hr was mainly attributed to the increase in neutrophils (Fig.5). After 1630 hr the neutrophils showed a decrease while the lymphocytes correspondingly showed an increase in numbers. These changes may be due to the removal of the stimulatory effect of Dexadreson. The bone marrow serves as a reserve of leucocytes, especially granulocytes. In response to the stimulatory effect of increased corticosteroids the neutrophils were mobilized into the blood circulation, resulting in neutrophilia. At the same time cortisol causes a depression of lymphoesis, giving rise to lymphopenia (Adnan et al., 1985).

In any haematolgical analysis the monocytes, eosinophils and basophils present difficulties in interpretation since they only

Fig. 1

Mean value of WBC and protein of Jamnapari-katjang goats (Non-treatment day)

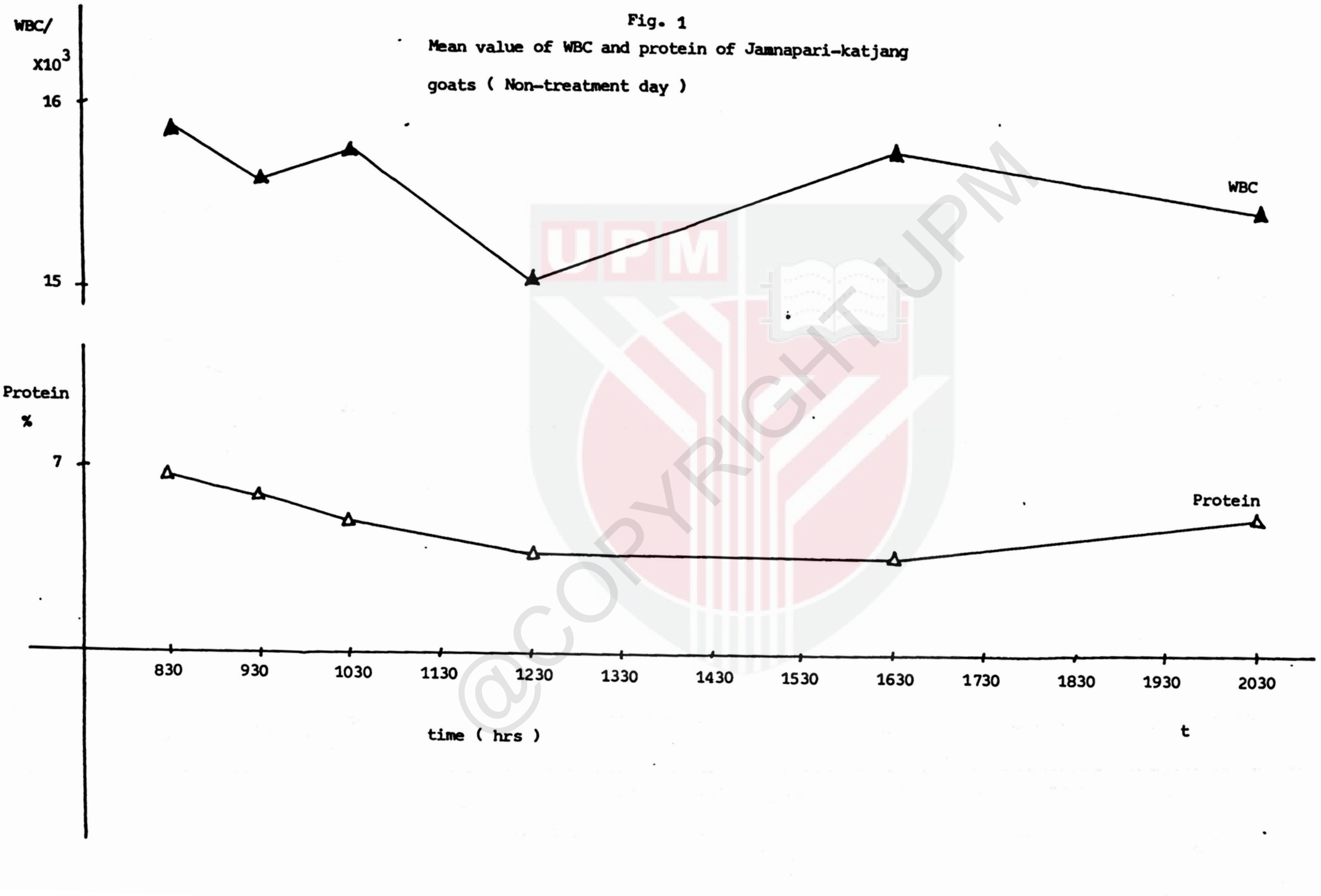


Fig. 2 .

Mean differential count of Jamnapari-katjang goats (Non-treatment day)

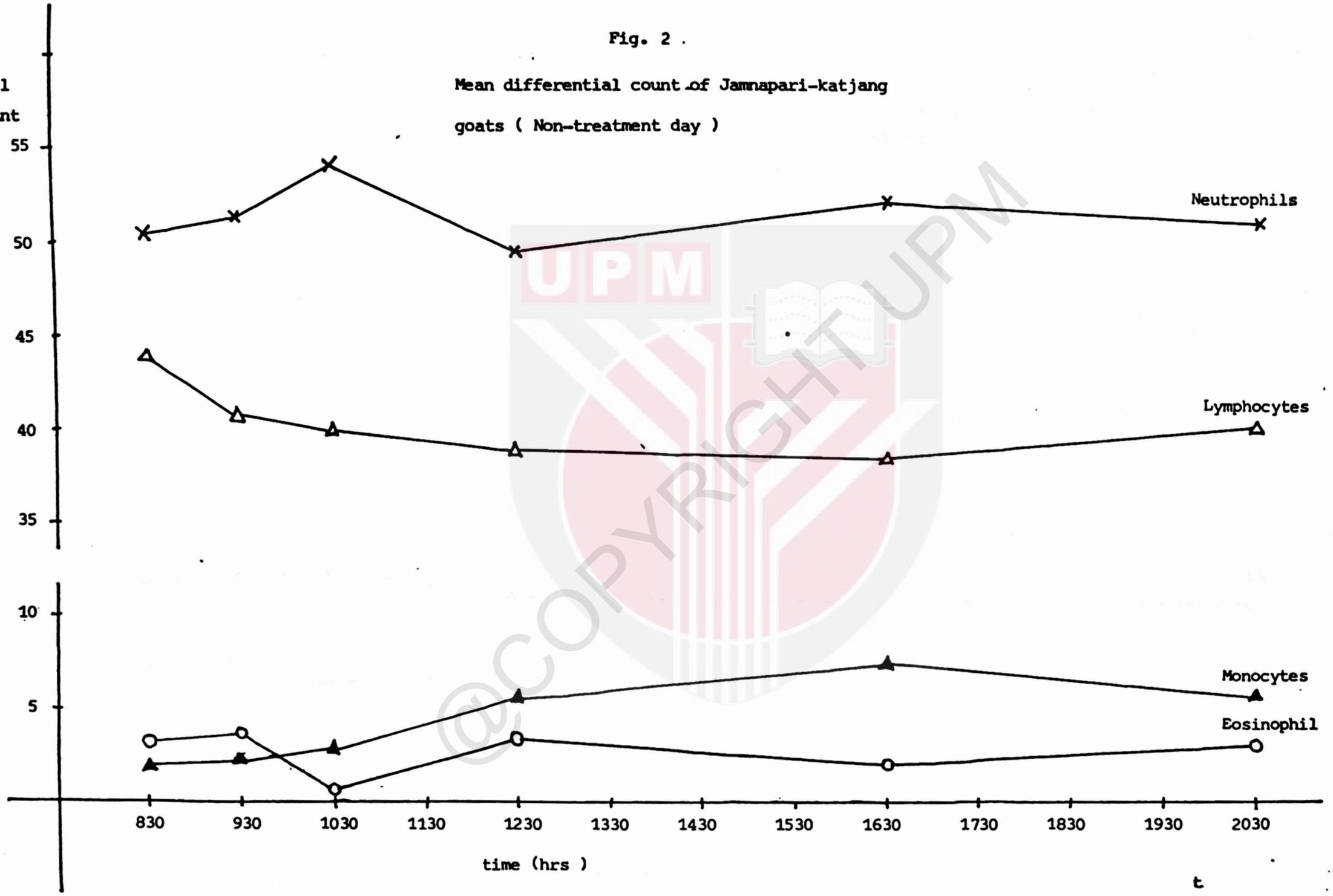


Fig. 3

Mean of the PCV, RBC and Hb of the normal Jamnapari-katjang goats, (Non treatment)

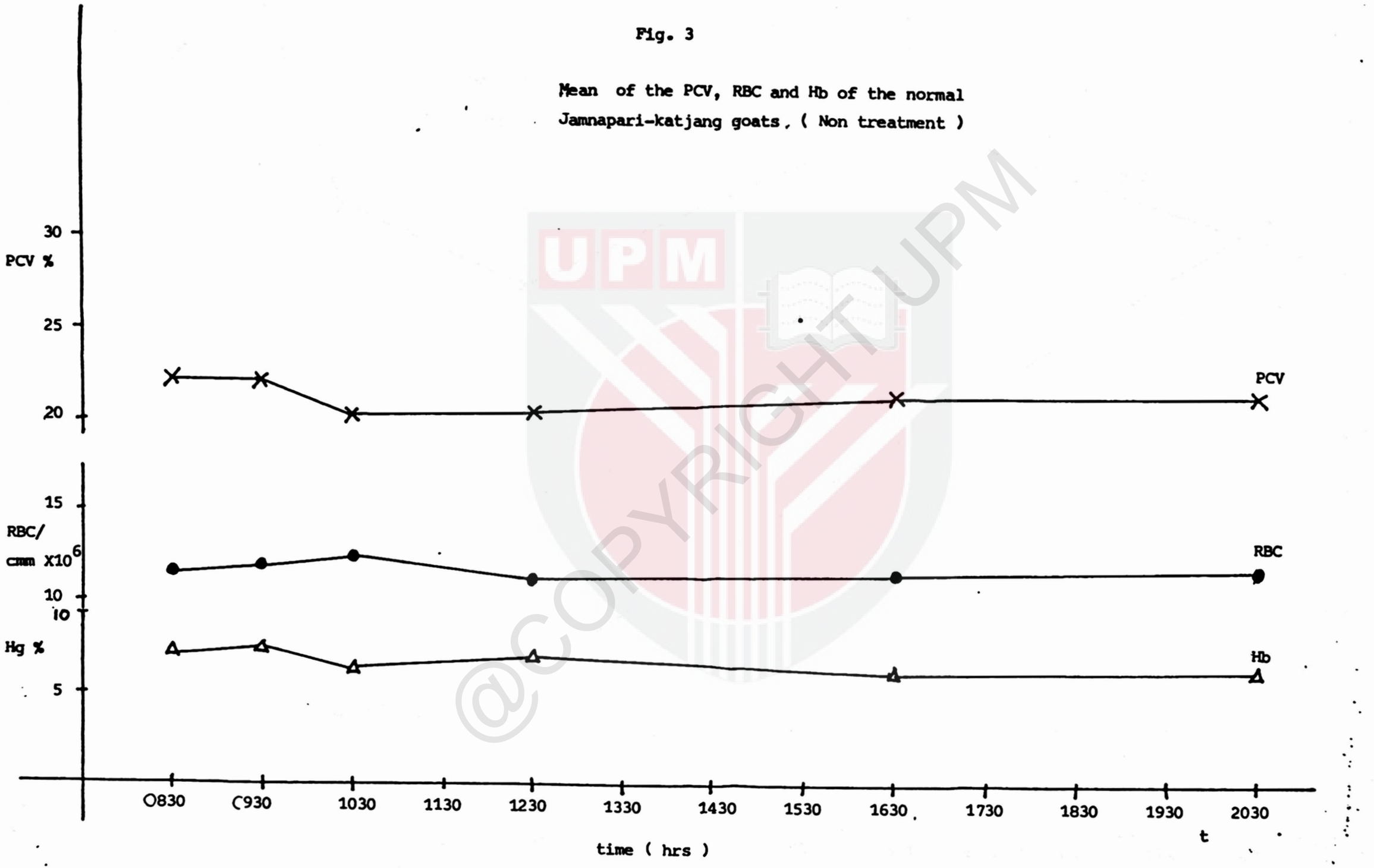


Fig. 4

Mean values of PCV and WBC of Jamnapari-katjang goats (treated with Dexadresson^{R})

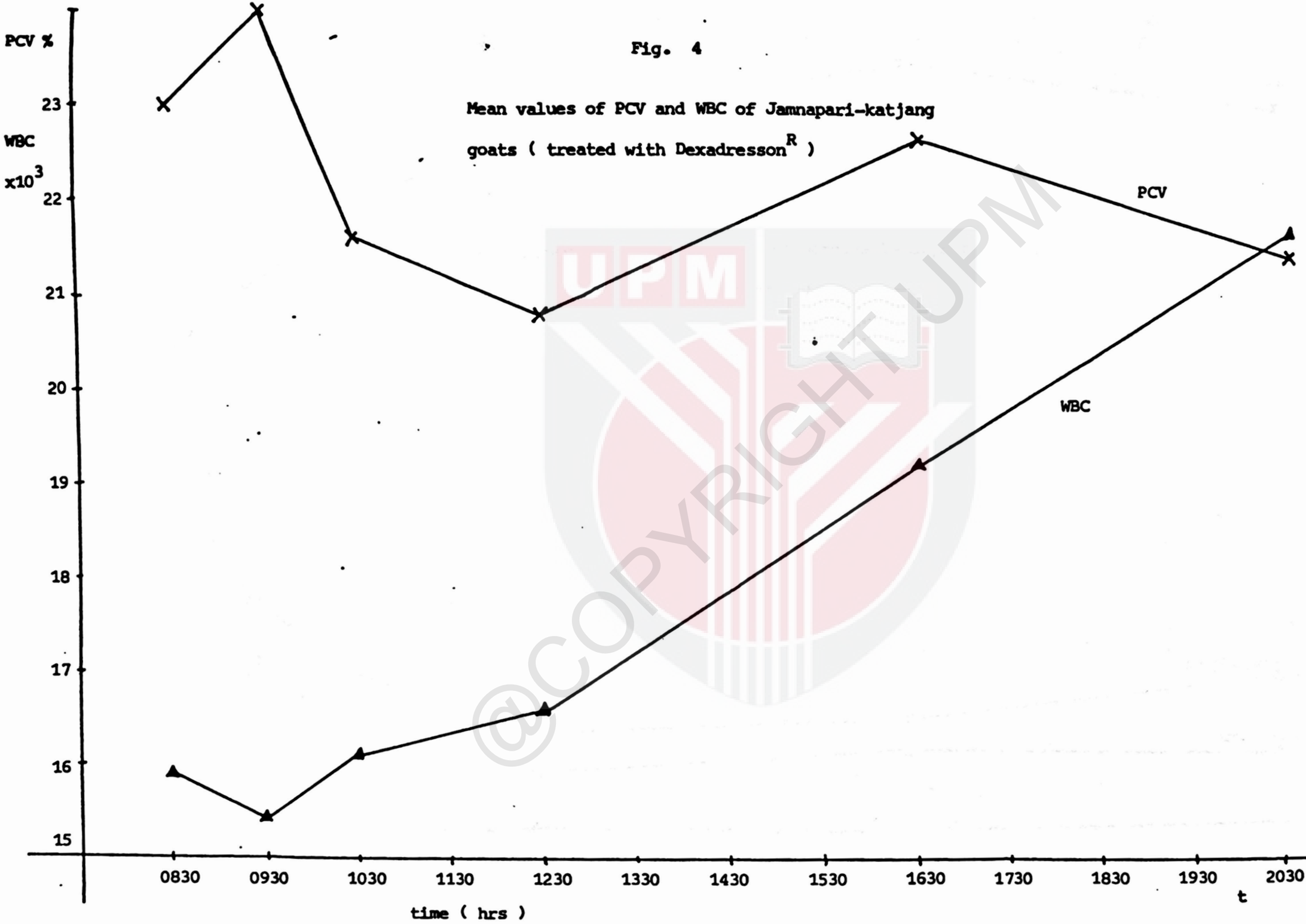
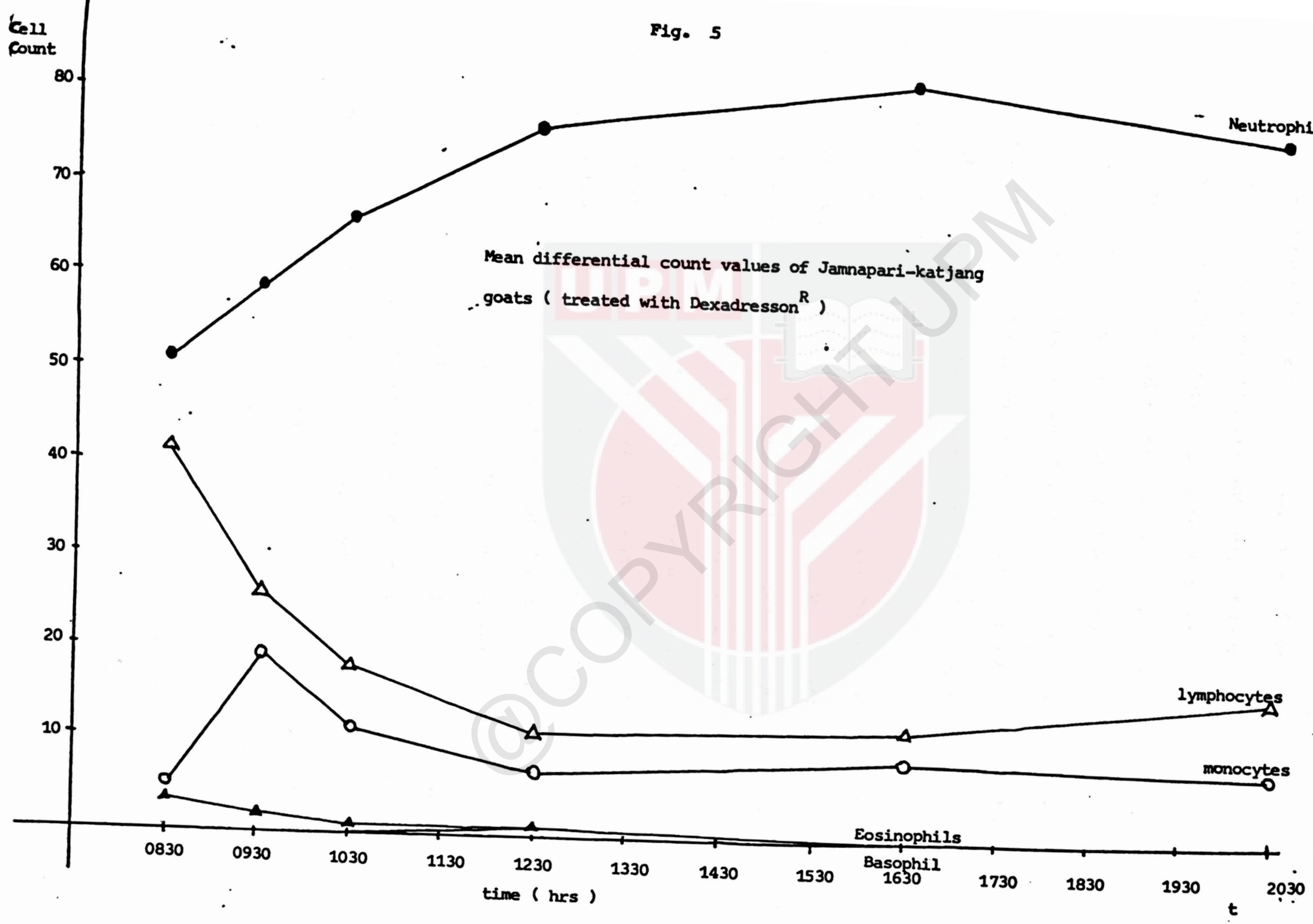


Fig. 5



Mean differential count values of Jamnapari-katjang goats (treated with Dexadresson^{R})

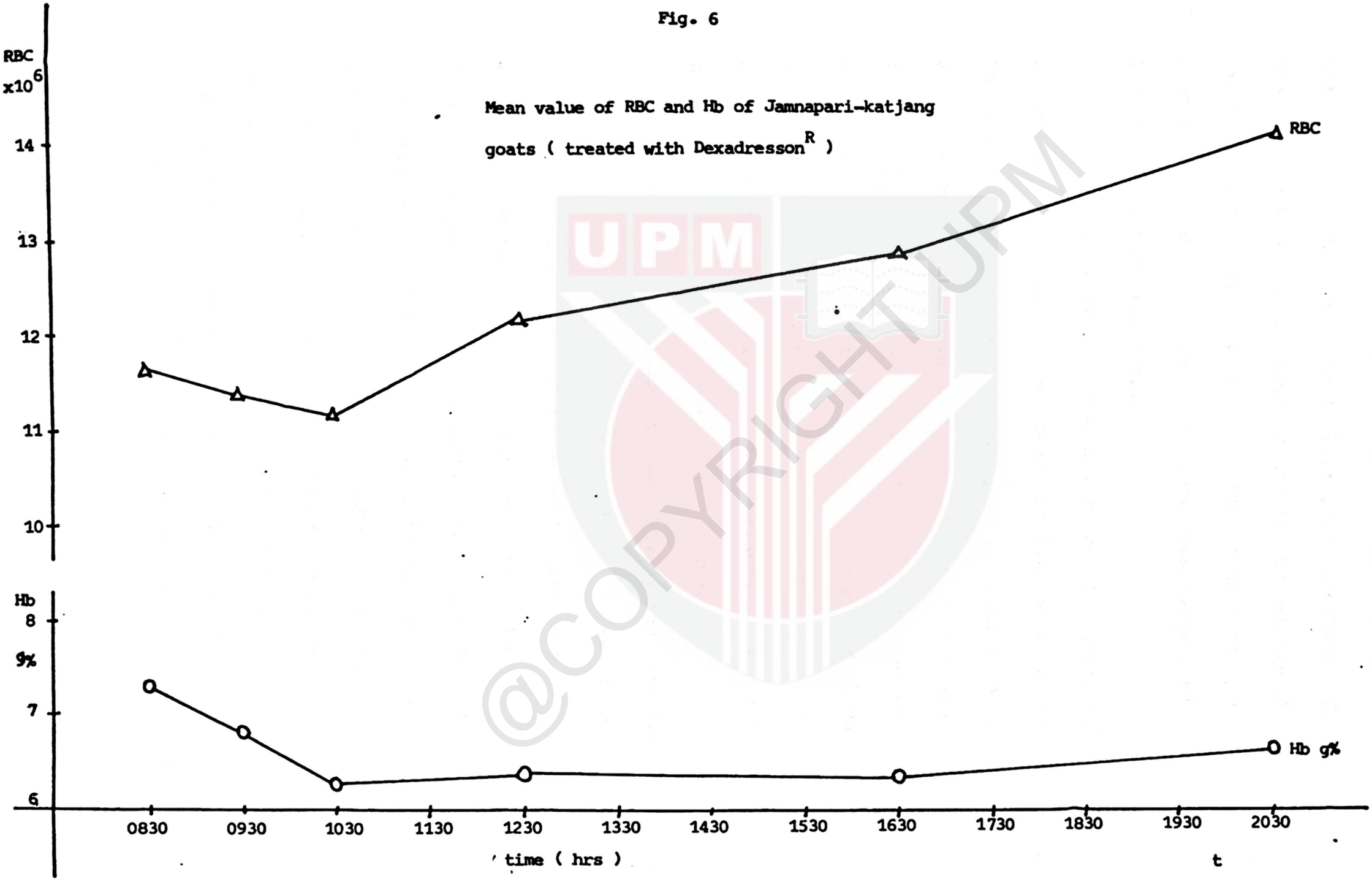
constitute a small percentage of the total WBCs. In this study, the eosinophils and the basophils showed a pattern of eosinopenia and basopenia respectively in response to Dexadresson treatment (Fig.5). Eosinophils in the peripheral blood are associated with blood histamine that chemotactically attracts these cells from bone marrow for antihistaminicc activity. Corticosteroids are known for their neutralizing effect on histamine; therefore, increased corticosteroids in blood depress eosinophil migration into circulation, giving rise to eosinopenia.

The total RBC count (Fig.6) showed a decrease at the first two sampling hours (0930 and 1030 hr) after Dexadreson treatment. This was followed by increased values (polycythemia) at the last three sampling hours (1230, 1630 and 2030 hr). The PCV reached its highest value at 0930 hr followed by decreased values (Fig. 4). The haemoglobin concentration (Fig. 6) showed decreased values after dexadreson treatment. The RBC count and PCV changes were in reverse for those observed for these parameters on the nontreatment day (control values). The spleen functions as a reservoir for RBCS. Stress can cause the contraction of the spleen, resulting in an increase of RBCs, PCV and Hb concentration (Perry et al 1959). Since increased plasma corticosteroids are synonymus with stress reaction, the increased corticosteroids level may cause the contraction of the spleen (Adnan et al., 1985).

After Dexadreson treatment the total WBC count showed a marked increase ($p < 0.01$) by 1630 and 2030 hr, ie. the effect of

Fig. 6

Mean value of RBC and Hb of Jamnapari-katjang goats (treated with Dexadresson^{R})



Dexadresson was detectable significantly by the eight hour post-treatment (Fig.4). A pattern of neutrophilia and lymphopenia was observed by the first hour post treatment (Fig.5). At 1630 hr the value of neutrophils started to decline while that of lymphocytes started to increase. This relationship of decreased neutrophils to increased lymphocytes was maintained until the last sampling time (2030 hr).

The chronic effect of Dexadreson on the differential count is presented in Figs.7 & 8. Neutrophilia was generally observed. There was also evidence of lymphopenia, monocytosis, eosinopenia and basophenia. The value of RBC at 1230 hr sampling on day 7 increased compared to 0830 hr sampling. The WBC value at 1230 hr sampling was slightly lower on day 7 as compared to day 1. The value started to decline on day 2 to reach the lowest value on day 4. Significant effect of Dexadreson on haematological parameters was observed to be on day 4 onwards.

The results for plasma glucose (Fig.9) and protein (Fig.1) concentrations showed an increase and a decrease in concentration respectively as a result of Dexadreson treatment. These effects of corticosteroids may involve the body metabolism. Corticosteroids depress utilization of glucose by tissue cell. They also stimulates the body cells to convert proteins and the glycerol portion of fats into glucose. Therefore, corticosteroids increase glucose blood level. On the other hand, cortcosteroids supress the rate of protein formation and enhance the breakdown of protein already present in the cell into amino acid. This effect tends to decrease the blood protein level.

Fig. 7

The chronic effect of corticosteroid (Dexadresson^{R})
on differential count of Jamnapari-katjang goats

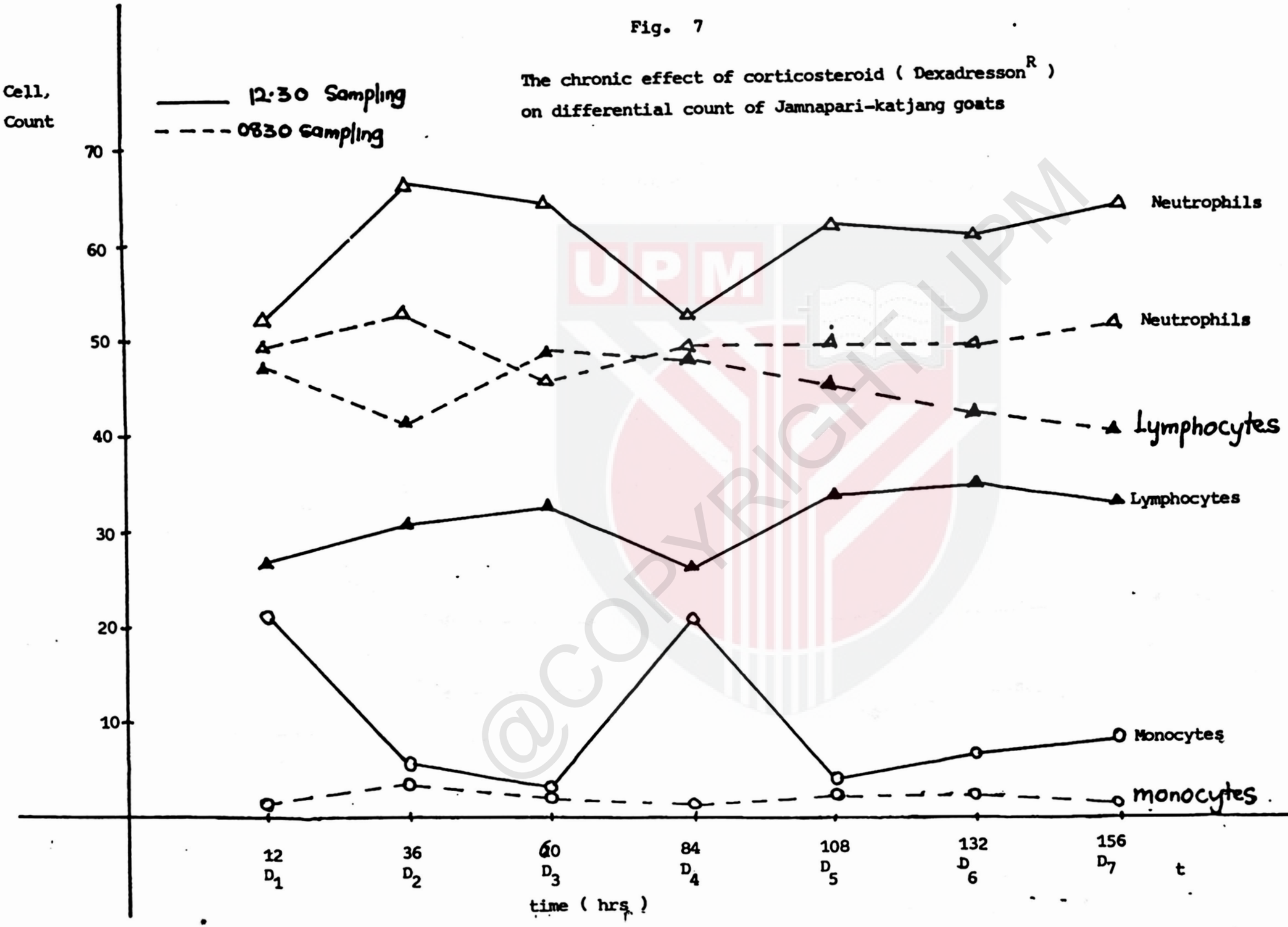
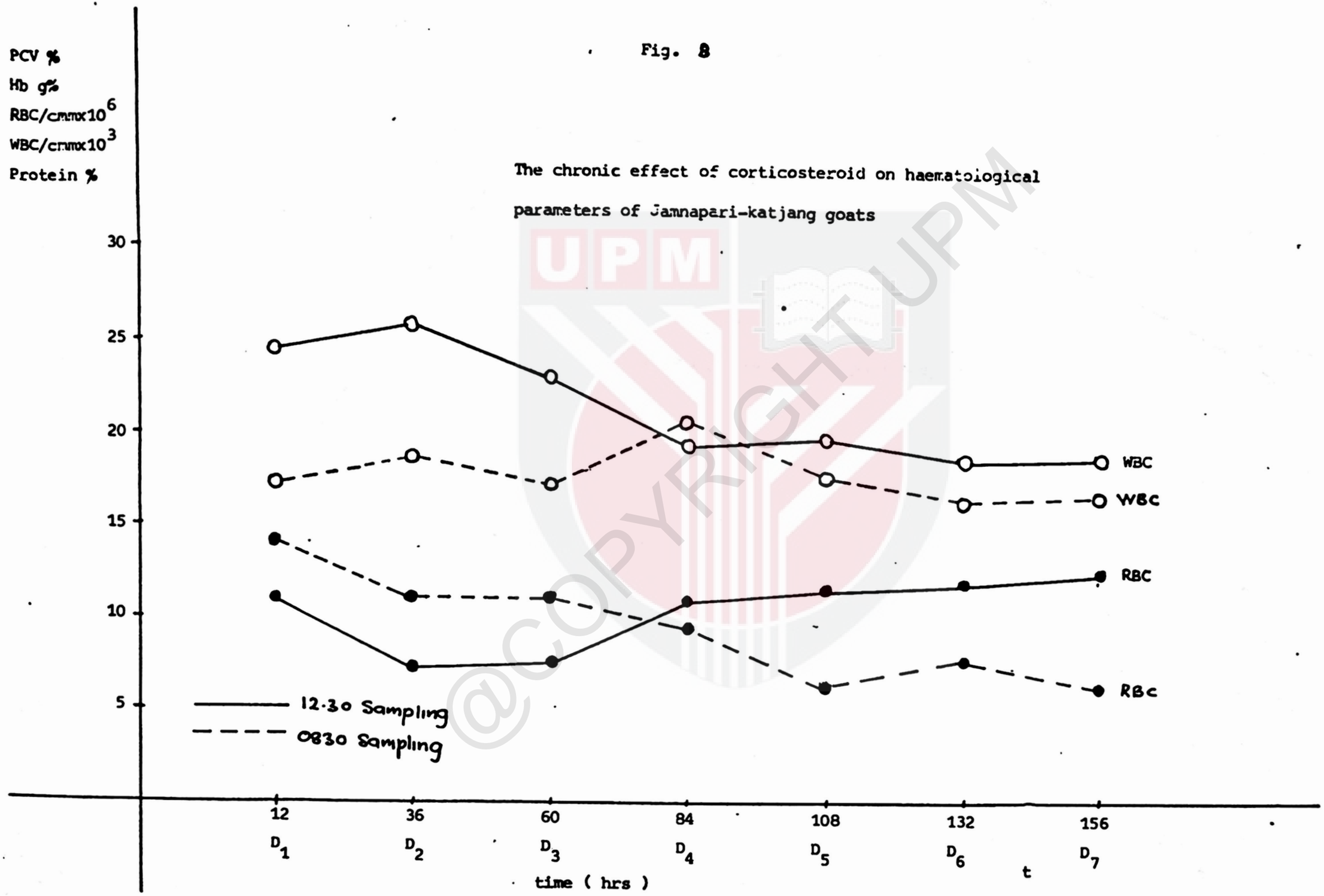


Fig. 8

The chronic effect of corticosteroid on haematological parameters of Jamnapari-katjang goats



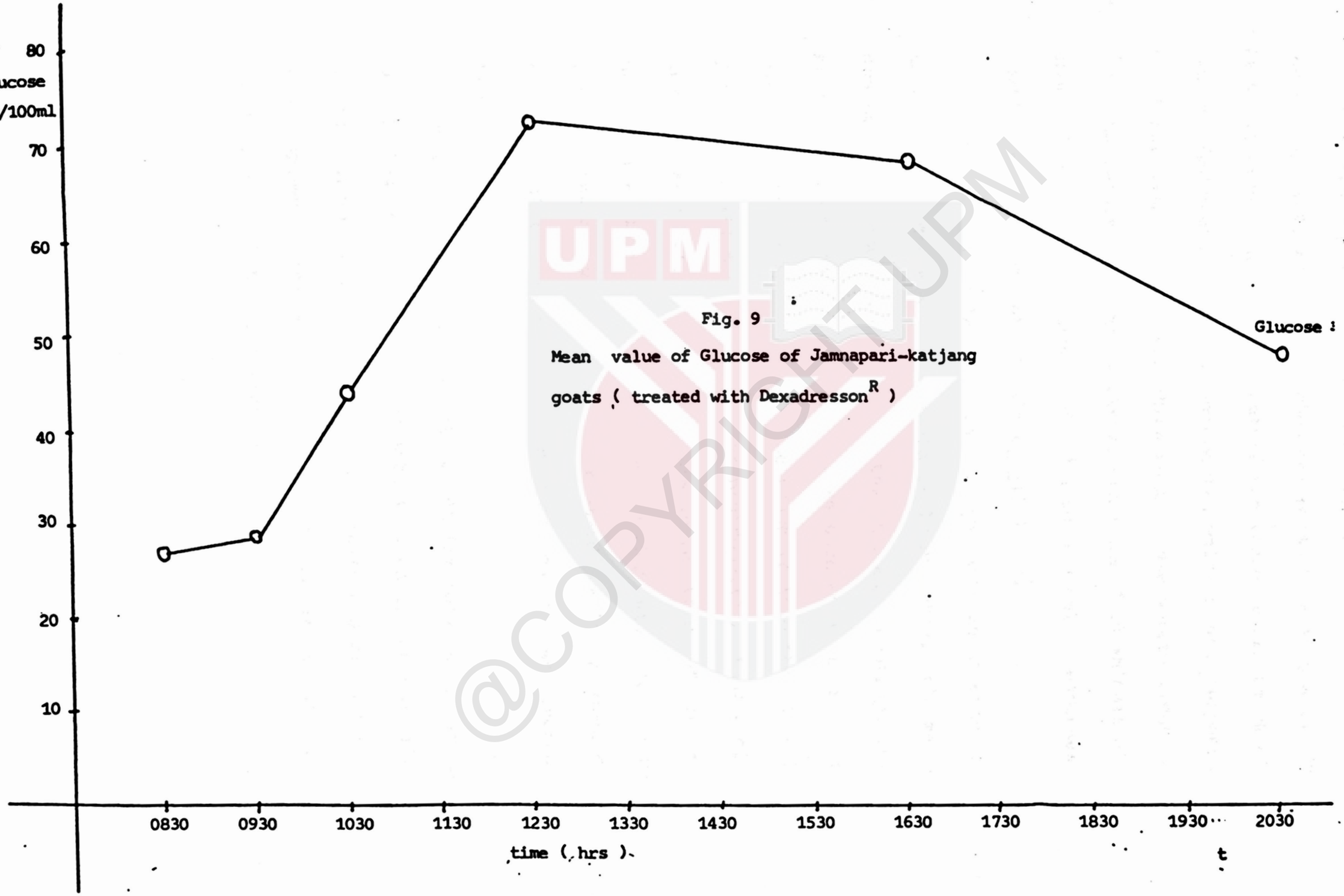


Fig. 9

Mean value of Glucose of Jamnapari-katjang goats (treated with Dexadresson^{R})

The results suggest that increased corticosteroid level in the blood, influences haematological parameters in goats. There is a lag time of a few hours before the response can be detected, except for neutrophils and lymphocytes which show a response by the first sampling hour post-treatment .These observations agree with the results of other workers. Other domestic animals also show the same pattern of haematological responses to cortiosteroid treatment (Schalm et al, 1975).

Cortisol acts relatively rapidly to cause an atrophy of the thymus and to decrease the numbers of lymphocytes, plasma cells, eosinophils and basophils in the blood. Neutrophilia and monocytosis are due to several factors such as an increase in the mobilization of the marginated neutrophils into the circulating pool, inhibition of diapedesis of neutrophils , thus prolonging their half-life, and an increase in the rate of release of neutrophils from the bone marrow. Under high corticosteroid level, there will be an increased cellular demand for macromolecular activities which then lead to an increase in monocyte number.

The increase in total WBC count (leucocytosis) is mainly attributed to the increased mobilization of neutrophils into blood circulation. Increase in corticosteroid blood level also cause spleenic contraction which is responsible for the increase in RBC, PCV and Hb concentration.

CONCLUSIONS

It is concluded that the synthetic corticosteroid (Dexadresson) has significant effects on haemtological parameters of Jamnapari-Kacang goats. The effects include neutrophilia, lymphopenia, monocytosis, eosinophenia and basopenia. Other effects include leucocytosis, an increase in PCV, Hb concentration, total RBC and plasma glucose concentration and a decrease in plasma protein concentration.

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APPENDIX

Tables

Time: 8.30 am

Normal blood sample

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	17	22	26	24	23
Hb g% Gm/100 ml	6.1	7.2	8.5	7.7	7.2
RBC/cmmx10^6	11.96	10.45	14.20	11.40	10.58
WBC/cmmx10^3	13.50	9.15	21.10	26.40	9.20
Glucose mg/100 ml	100.35	83.85	65.98	45.36	69.42
Protein g %	7.0	7.0	7.0	6.8	7.0
Differential Count					
Nutrophil	52	49	47	49	55
Lymphocytes	43	46	43	45	44
Monocytes	1	2	2	4	1
Eosinophils	4	3	8	2	0
Basophils	0	0	0	0	0

Time: 9.30 am

Normal blood sample

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	16	23	26	24	23
Hb g % Gm/100 ml	6.3	5.7	9.0	8.2	8.0
RBC/cmmx10^6	11.61	10.82	15.1	10.89	10.48
WBC/cmmx10^3	13.20	9.0	19.80	26.30	9.60
Glucose mg/100 ml	48.11	35.74	45.37	71.13	70.80
Protein g%	7.0	6.8	6.8	6.8	7
Differential Count					
Nutrophil	49	53	48	50	57
Lymphocytes	47	40	40	46	40
Monocytes	2	3	4	1	1
Eosinophils	2	4	8	3	2
Basophils	0	0	0	0	0

Time: 10.30 am

Non Treated

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	16	20	23	22	21
Hb g % Gm/100 ml	5.9	6.8	6.8	6.8	7.0
RBC/cmmx10^6	12.06	11.1	14.62	11.2	11.2
WBC/cmmx10^3	13.15	9.15	20.65	26.4	8.95
Glucose mg/100 ml	33.33	58.42	59.79	49.48	70.79
Protein g%	6.8	6.6	6.8	6.8	6.6
Differential Count					
Nutrophil	49	51	56	64	52
Lymphocytes	44	46	40	33	47
Monocytes	3	3	4	3	1
Eosinophils	4	0	0	0	0
Basophils	0	0	0	0	0

Time: 12.30 am

Non Treated

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	17	21	23	22	21
Hb g% Gm/100 ml	6.1	7.2	7.7	7.2	7.0
RBC/cmmx10^6	11.71	11.70	11.52	10.05	11.2
WBC/cmmx10^3	13.50	9.25	19.55	26.12	9.40
Glucose mg/100 ml	43.30	68.04	19.24	25.77	16.15
Protein g%	6.6	6.6	6.6	6.6	6.4
Differential Count					
Nutrophil	48	52	50	46	53
Lymphocytes	40	42	39	44	40
Monocytes	6	4	6	7	4
Eosinophils	6	2	5	3	3
Basophils	0	0	0	0	0

Time: 4.30 pm

Non-treated

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	17	22	25	23	20
Hb g % Gm/100 ml	5.9	6.3	6.5	6.8	6.5
RBC/cmmx10^6	13.33	12.45	11.95	8.95	10.60
WBC/cmmx10^3	12.80	9.50	19.70	26.40	10.20
Glucose mg/100 ml	56.70	25.43	26.46	25.17	98.97
Protein g%	6.8	6.6	6.0	6.8	6.4
Differential Count					
Nutrophil	50	49	50	53	59
Lymphocytes	40	40	43	39	31
Monocytes	8	6	4	8	10
Eosinophils	2	5	3	0	0
Basophils	0	0	0	0	0

Time: 8.30 pm

Non-treated

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	17	22	25	22	20
Hb g% Gm/100 ml	6.1	6.5	7.2	7.0	6.8
RBC.cmmx10^6	11.62	10.64	13.68	11.20	10.62
WBC/cmmx10^3	13.20	8.95	20.70	25.20	9.00
Glucose mg/100 ml	57.39	75.60	35.74	58.41	90.72
Protein	6.8	7.0	6.6	6.6	6.8
Differential Count					
Nutrophil	49	55	48	49	55
Lymphocytes	38	40	40	44	38
Monocytes	6	4	8	6	5
Eosinophils	7	1	4	1	2
Basophils	0	0	0	0	0

Normal blood sample

Average values of the blood parameters of Jamnapari-katjang goats.

Time	Pre-Tx	Treated				
	8.30 am	9.30 am	10.30 am	12.30 am	4.30 am	8.30 am
PCV %	22.4	22.4	20.4	20.8	21.4	8.30
Hb % Gm/100 ml	7.34	7.44	6.66	7.04	6.40	6.72
RBC/cmmx10^6	11.72	11.78	12.04	11.24	11.46	11.55
WBC/cmmx10^3	15.87	15.58	15.76	15.56	15.72	15.41
Glucose/mg/100 ml	72.99	54.23	54.36	34.50	46.67	62.57
Protein g %	6.96	6.88	6.72	6.56	6.52	6.76
Differential Count						
Nutrophil	50.4	51.4	54.4	49.8	52.2	51.2
Lymphocytes	44.2	42.6	42.0	41.0	38.6	40.0
Monocytes	2.0	2.2	2.8	5.4	7.2	5.8
Eosinophils	3.4	3.8	0.8	3.8	2.0	3.0
Basophils	0	0	0	0	0	0

Time: 8.30 pre-treatment

Dosage: 5 mg (dexadvesson)

Concentration 2 mg/ml volume: 2.5 ml

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	17	23	26	25	24
Hb g % Gm/100 ml	6.5	8.5	6.5	7.2	7.7
RBC/cmn $x10^6$	11.84	9.40	14.98	11.20	10.74
WBC/cmm $x10^3$	13.75	9.40	20.90	26.50	9.25
Glucose mg/100 ml	17.50	18.45	33.05	45.92	21.46
Protein g %	6.0	6.2	6.8	6.8	6.8
Differential Count					
Nutrophil	49	48	52	55	52
Lymphocytes	39	41	43	38	40
Monocytes	6	7	2	3	7
Eonnophils	6	4	3	4	1
Basophils	0	0	0	0	0

Time: 9.30 am

Treated: Dexadresson

Volume : 2.5 ml.

	1 1005	2 6622	3 Blacky	3 1013	4 1002
PCV %	18	25	27	25	25
Hb g % Gm/100 ml	6.3	7.5	7.5	5.9	7.0
RBC/cmm $x10^6$	11.40	10.04	14.42	10.96	10.44
NBC/cmm$x10^3$	13.25	9.05	20.10	25.75	9.0
Glucose mg/100 ml	17.17	31.76	28.76	39.31	27.90
Protein g%	6.0	6.0	7.0	7.0	6.4
Differential Count					
Nutrophil	52	57	59	72	55
Lymphocytes	29	19	25	23	36
Monocytes	21	22	20	12	23
Eosinophils	4	2	2	3	1
Basophils	0	0	0	0	0

Time: 10.30 am

Treated: Dexadresson

Volume : 2.5 ml.

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	16	23	24	22	23
Hb g % Gm/100 ml	5.7	6.3	6.8	5.5	7.0
RBC/cmnx10^6	11.50	10.14	14.30	10.40	9.84
WBC/cmmx10^3	14.0	9.75	20.40	26.50	9.8
Glucose mg/100 ml	30.05	43.35	40.77	48.50	58.80
Protein g%	6.2	5.4	6.8	6.8	6.2
Differential Count					
Nutrophil	61	61	69	72	70
Lymphocytes	17	20	22	20	15
Monocytes	18	18	6	8	10
Eosinophils	1	1	2	0	5
Basophils	0	0	0	0	0

Time: 12.30 am

Treated: Dexadresson

Volume : 2.5 ml.

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	15	22	23	22	22
Hb g % Gm/100 ml	5.2	7.5	6.5	5.7	7.2
RBC/cmmx10^6	11.66	14.50	14.64	10.76	9.20
WBC/cmmx10^3	14.40	9.50	21.20	25.05	11.40
Glucose mg/100 ml	68.24	71.24	73.40	55.06	84.70
Protein g%	5.8	6	6.8	6.6	6.6
Differential Count					
Nutrophils	74	79	79	85	65
Lympocytes	15	11	8	10	14
Monocytes	9	9	3	2	13
Eosinophil	2	1	4	1	0
Basophils	0	0	6	1	0

Time: 4.30 pm

Treated: Dexadresson

Volume : 2.5 ml

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	17	24	25	24	23
Hb g % Gm/100 ml	5.1	7.2	6.3	5.9	7.2
RBC/cmmx10^6	12.20	15.50	14.72	11.92	9.94
WBC/cmmx10^3	16.65	14.50	23.40	30.50	12.40
Glucose mg/100 ml	55.37	76.82	74.68	70.81	66.95
Protein g%	6.2	5.8	6.8	6.8	6.0
Differential Count					
Nutrophil	82	79	81	84	75
Lymphocytes	6	12	12	15	15
Monocytes	12	9	7	5	17
Eosinophils	0	0	0	0	0
Basophils	0	0	0	0	9

Time: 8.30 pm

Treated: Dexadresson

Volume : 2.5 ml.

	1 1005	2 6622	3 Blacky	4 1013	5 1002
PCV %	15	23	24	23	22
Hb g % Gm/100 ml	5.2	7.5	7.0	6.3	7.2
RBC/cmmx10^6	14.16	16.50	14.82	14.48	10.82
WBC/cmmx10^3	17.05	16.50	24.05	31.65	19.25
Glucose mg/100 ml	33.48	36.48	44.21	63.69	66.52
Protein g%	6.6	6.8	7	7	6.8
Differential Count					
Nutrophil	79	80	76	83	66
Lymphocytes	12	19	18	18	14
Monocytes	9	8	4	5	15
Eosinophils	0	0	0	0	0
Basophils	0	0	0	0	0

Treated blood samples with Dexadresson.

Average values of blood parameters of Jamnapari-katjang goats.

Time	Pre-Tx	Treated				
	8.30 am	9.30 am	10.30 am	12.30 am	4.30 am	8.30 am
PCV %	23	34	21.6	20.8	22.6	21.4
Hb % Gm/100 ml	7.28	6.84	6.26	6.42	6.34	6.64
RBC/cmm $x10^6$	11.63	11.45	11.24	12.15	12.86	14.16
WBC/cmm $x10^3$	15.96	15.43	16.09	16.51	19.49	21.70
Glucose/mg/ 100 ml	27.30	28.98	44.29	70.53	68.93	48.88
Protein g%	6.52	6.48	6.28	6.36	6.32	6.84
Differential Count						
Nutrophil	51.2	59	66.6	76.4	80.2	76.8
Lymphocytes	40.2	26.4	18.8	11.6	12.0	16.2
Monocytes	5.0	19.6	12.0	7.2	9.4	8.2
Eosinophils	3.6	2.4	1.8	1.6	0	0
Basophils	0	0	0	1.4	0	0

Normal blood parameters of the goats from UPM Goats Unit.

Katjang-Jamnapari Cross.

	3016	6199	6636	6621	3025
PCV %	25	28	27	25	24
Hb g% Gm/100 ml	8.2	9.0	8.0	8.5	8.0
RBC/cmmx10^6	15.30	14.60	16.40	14.30	16.80
WBC/cmmx10^3	17.75	16.00	17.50	16.05	16.25
Glucose mg/100 ml	50.0	61.39	52.48	36.63	40.10
Protein g%	5.8	7.0	5.8	5.4	6.0
Differential Count					
Nutrophil	42	38	37	31	43
Lymphocytes	51	53	55	47	51
Monocytes	3	4	4	16	5
Eosinophils	4	5	4	6	1
Basophils	0	0	0	0	0

Time: 9.30 am

Ladang Universiti Pertanian Malaysia (Unit Kambing)

	NN1	NN2	3032	6650	6643
PCV %	27	24	23	25	27
Hb g % Gm/100 ml	10.1	8.5	6.8	8.2	7.7
RBC/cmx10^6	14.75	15.00	26.25	16.95	14.60
WBC/cmmx10^3	15.3	16.90	18.0	15.90	16.30
Glucose/mg/100 ml	42.08	53.47	67.33	38.61	42.08
Protein g %	6.0	5.6	5.2	5.6	6.2
Differential Count					
Nutrophil	45	43	40	43	46
Lymphocytes	50	49	55	52	51
Monocytes	2	7	3	3	2
Eosinophils	3	1	2	2	1
Basophils	0	0	0	0	0

The chronic effect of corticosteroid (Dexadresson^{R}) on haematological parameters of Jamnapari-katjang goats.

Time: 8.30 a.m

(1) Value of PCV%

Days	1020	1018	1015	1022	1017
D_1	22	22	24	19	27
D_2	23	22	23	19	26
D_3	21	23	22	19	21
D_4	19	20	20	16	22
D_5	18	20	20	17	23
D_6	18	20	21	16	22
D_7	17	19	19	16	21

(2) Value of Haemoglobin g%

Days	1020	1018	1015	1022	1017
D_1	7.0	7.7	7.7	6.5	9.5
D_2	7.7	7.2	7.7	5.7	7.7
D_3	6.3	8.5	8.2	7.2	7.7
D_4	6.3	7.0	6.8	5.2	6.8
D_5	5.5	6.5	6.1	5.2	7.5
D_6	5.2	6.4	6.0	5.0	7.3
D_7	5.1	6.1	5.8	5.1	7.0

(3) Value of RBC/cmmx10^6

Days	1020	1018	1015	1022	1017
D_1	12.29	16.31	11.78	9.42	15.45
D_2	9.57	12.50	13.81	7.10	10.92
D_3	6.59	13.93	12.26	8.89	11.68
D_4	7.51	8.76	10.82	6.51	9.54
D_5	6.02	6.06	6.04	3.64	4.10
D_6	7.5	8.78	7.10	7.86	6.80
D_7	7.2	7.32	6.42	7.12	6.94

(4) Value of WBC/cmmx10^3

Days	1020	1018	1015	1022	1017
D_1	16.85	13.75	24.65	10.75	16.45
D_2	16.4	15.75	23.55	17.40	16.4
D_3	14.6	12.95	22.7	12.45	18.85
D_4	19.8	16.15	26.40	13.85	20.05
D_5	18.10	13.0	23.50	8.7	19.64
D_6	17.82	12.6	23.14	8.5	18.94
D_7	17.84	12.9	22.62	8.2	19.94

The chronic effect of corticosteroid (Dexadresson^{R}) on differential count of Jamnapari-katjang goats.

Time: 8.30 a.m

(1) Value of Nutrophils

Days	1020	1018	1015	1022	1017
D_1	44	46	65	50	42
D_2	44	53	65	54	51
D_3	55	45	42	47	45
D_4	44	46	65	50	42
D_5	50	42	58	45	54
D_6	52	46	54	48	59
D_7	48	50	56	50	51

(2) Value of Lymphocytes

Days	1020	1018	1015	1022	1017
D_1	53	53	32	44	56
D_2	52	38	34	39	45
D_3	38	50	52	50	53
D_4	53	53	32	44	56
D_5	45	50	35	40	55
D_6	43	46	30	35	54
D_7	40	42	33	35	50

(3) Value of Monocytes

Days	1020	1018	1015	1022	1017
D_1	3	1	2	1	2
D_2	4	5	1	6	2
D_3	5	4	2	2	2
D_4	3	1	2	1	2
D_5	2	5	3	4	4
D_6	2	4	2	4	4
D_7	3	3	2	3	4

(4) Value of Eosinophils

Days	1020	1018	1015	1022	1017
D_1	0	0	1	5	0
D_2	0	4	0	3	1
D_3	2	1	1	1	0
D_4	3	1	2	1	2
D_5	0	2	1	2	2
D_6	0	1	1	0	0
D_7	0	1	0	1	0

( ) Value of Basophils

Days	1020	1018	1015	1022	1014
D_1	0	0	0	0	0
D_2	0	0	0	0	0
D_3	0	0	0	0	0
D_4	0	0	0	0	0
D_5	0	0	0	0	1
D_6	0	0	1	0	0
D_7	0	0	0	0	0

The chronic effect of corticosteroid (Dexadresson^{R}) on haematological parameters of Jamnapari-katjang (goats) (treated).

Time: 12.30 a.m

(1) Value of PCV %

Days	1020	1018	1015	1022	1017
D_1	20	20	21	16	24
D_2	20	19	19	17	22
D_3	19	20	21	14	21
D_4	18	20	17	13	22
D_5	19	20	15	11	20
D_6	19	19	16	12	19
D_7	17	18	14	12	17

(2) Value of Haemoglobin g%

Days	1020	1018	1015	1022	1017
D_1	6.1	6.8	6.3	5.5	8.5
D_2	6.1	6.3	6.1	5.5	7.0
D_3	6.1	5.5	6.5	4.3	6.8
D_4	6.3	7.0	6.3	5.1	7.5
D_5	6.2	6.8	6.1	5.0	7.2
D_6	6.0	6.5	5.9	5.0	7.0
D_7	6.2	6.7	6.0	5.1	7.2

(3) Value of RBC/cmmx10^6

Days	1020	1018	1015	1022	1017
D_1	10.61	12.01	11.40	7.15	13.99
D_2	9.18	10.12	7.32	3.82	5.61
D_3	6.39	3.29	7.75	5.11	12.75
D_4	11.20	16.82	11.39	5.04	9.84
D_5	11.6	16.92	11.5	5.30	9.90
D_6	11.7	16.94	11.6	5.30	10.01
D_7	11.82	17.01	11.6	5.48	10.26

(4) Value of WBC/cmmx10^3

Days	1020	1018	1015	1022	1017
D_1	22.8	19.4	35.05	20.8	25.8
D_2	29.65	22.85	33.5	23.4	19.0
D_3	26.55	20.10	40.55	13.8	14.5
D_4	19.8	16.15	26.40	13.85	18.85
D_5	19.6	16.2	26.84	13.94	18.92
D_6	19.4	16.0	25.34	12.92	18.94
D_7	19.8	16.4	25.20	12.96	18.98

The chronic effect of corticosteroid (Dexadresson^{R}) on differential count of Jamnapari-katjang goats (treated).

Time: 12.30 a.m

(1) Value of Nutrophil

Days	1020	1018	1015	1022	1017
D_1	36	52	64	64	41
D_2	62	49	67	68	71
D_3	60	64	63	67	59
D_4	52	36	64	64	41
D_5	71	61	66	53	56
D_6	66	60	62	60	58
D_7	68	62	64	60	56

(2) Value of Lymphcytes

Days	1020	1018	1015	1022	1017
D_1	26	40	18	19	30
D_2	33	44	26	26	24
D_3	37	32	32	30	33
D_4	40	26	15	19	30
D_5	27	35	31	42	34
D_6	26	38	34	50	28
D_7	26	34	28	46	32

(3) Value of Monocytes

Days	1020	1018	1015	1022	1017
D_1	37	6	17	17	29
D_2	5	7	6	5	4
D_3	3	4	3	2	6
D_4	6	37	17	17	27
D_5	2	4	3	4	8
D_6	10	6	4	6	8
D_7	12	8	6	6	12

(4) Value of Eosinophils

Days	1020	1018	1015	1022	1017
D_1	0	0	0	0	0
D_2	0	0	1	1	1
D_3	0	0	1	1	2
D_4	0	0	0	0	0
D_5	0	0	0	1	2
D_6	0	1	1	0	1
D_7	1	0	1	0	1

(5) Value of Basophils

Days	1020	1018	1015	1022	1017
D_1	0	0	0	0	0
D_2	0	0	0	0	0
D_3	2	0	1	0	0
D_4	0	1	1	0	0
D_5	0	0	0	0	0
D_6	0	1	0	1	1
D_7	0	0	1	1	0