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EFFECT OF RECEIVING CHROMIUM PICOLINATE ON THE REPRODUCTIVE EFFICIENCY OF NEW ZEALAND WHITE AND V-LINE DOES IN SUMMER

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Abstract: *This study was conducted to study the effects of chromium picolinate CrP supplementation to rabbit diets during the summer season and its amelioration on reproductive traits of New Zealand White (NZW) and V-line rabbit breeds to extend their breeding season to be all year round.*

The experiment started from May to September (the summer breeding pause in Egypt). The selected doe in a herdbook (November to April at the same year) had at least three littering and similar reproductive performance for each breed. A total of 33 multiparous does (18 NZW and 15 V-line) were divided into three groups for each breed. The first group served as a control, whereas the 2nd and 3rd groups orally received a daily dose of 9 and 18 μg/doe of chromium picolinate CrP respectively throughout the experimental period.

Incidence of stillbirth increased ($P<0.01$) for V-line compared with NZW breed. This may be attributed to the fact that NZW breed is more adapted to hot climate in Egypt compared with V-line breed.

Rabbits supplemented with CrP in summer of either breed had greater total litter size, litter weight and viability percentage at birth ($P<0.01$) compared with control. Moreover, litter size, litter weight, viability percentage and milk yield at 21 and 28 days of age were significantly ($P<0.001$) higher for does receiving oral CrP compared with control in NZW and V-line breed.

Gestation length, total litter size, litter weight and viability percentage at birth were highly improved at the low level CrP (9 μg/doe/day) in the V-line breed. However, similar trend was recorded with the high level CrP (18 μg/doe/day) in the NZW does for two consecutive parities.

In rabbits that received the additional CrP during the two parities, the second parity recorded the highest reproductive efficiency for doe in NZW and V-line does compared with first parity or control.

During August, when ambient temperature and relative humidity were high, does that received the low CrP level in V-line and high CrP level in NZW breed conceived and gave the third parity. However control rabbit does at either NZW or V-line breed did not conceive or could not mate at all.

The magnitude of the increase of total litter size (76 bunnies), total litter weight at weaning (29.3 Kg) and conception rate(60%) for the V-line does given, 9µg/doe/day were higher than control does. However, in those NZW does given high level of CrP the respective values were 32 bunnies 13.4 Kg and 33%, respectively.

INTRODUCTION

Elemental chromium Cr is an essential micronutrient. It is required for optimal insulin activity and normal carbohydrate and lipid metabolism. Tri-valent chromium Cr^{+3} is recommended for the treatment of diabetes and obesity. A form of Cr that has recently received attention is the organically complexed Cr source, chromium picolinate CrP. This form of Cr consists of one molecule of (Cr^{3+}) complexed with three molecules of picolinic acid.

Several studies have shown that dietary chromium picolinate CrP supplementation can improve insulin action in swine (Steele *et al.*, 1977; Lindemann *et al.*, 1995a; Amoikan *et al.* 1995 and Matthews *et al.*, 2001). Also, Sahin *et al.* (2001) indicated that CrP had a positive effect on performance and increased the plasma insulin concentration of laying hens under cold stress. In rats, Cefalu *et al.* (2002) reported that CrP enhances insulin sensitivity and glucose disappearance and improves lipids in male obese hyperinsulinemic.

Insulin administration has several positive effects upon ovarian function, including an increase in ovulation rate (Cox *et al.*, 1987) and improving maturation of ovarian follicles in swine (Matamoros *et al.*, 1990). In addition the elevated concentration of insulin in blood is associated with increased plasma progesterone concentration during the luteal phase (Clowes *et al.,* 1994) in cows. Moreover, increased ovarian progesterone secretion during early luteal phase may enhance the secretion of uterine proteins during the early pregnancy in swine (Trout, 1995) and the uterus requires prolonged exposure to progesterone in order to be able to secrete several specific proteins, so-called histotrophs, which are thought to support the embryos at the time of implantation.

Longevity News Editorial Notes (2003) reported that supplementation of CrP for humans significantly enhanced insulin sensitivity. These initial results offer a potential new nutritional therapy for approximately 2 million American women suffering from polycystic ovarian syndrome (PCOS). PCOS is a little understood hormonal condition that is a leading cause of infertility, and is associated with insulin resistance, gestational diabetes and appears in a supplement to fertility.

Franklin and Odonliadis (2003) found a significant increase in serum free tryptophan (TRP) by treating rats with CrP. Chromium picolinate supplementation is considered as a protective management practice in a quail’s diet, reducing the negative effects of heat stress (Sahin *et al.*, 2002a). In addition, Sahin *et al.* (2002b) reported that, supplementing CrP and vitamin C improved the performance of cold-stressed hens.

In Egypt the breeding season of rabbits normally begins in October and ends in May each year, due to the negative effects of summer conditions on production and reproduction. The present work aimed to study the effect of chromium picolinate supplementation during Egyptian summer and its ameliorating effect on reproductive traits of NZW and V-line breeds of rabbits in a trial to extend its breeding season to include all year round.

MATERIALS AND METHODS

The experiments were carried out at El-Sabhia Poultry Research Station during 10 months and was divided into two periods: the first period from November 2002 to April 2003 (mild weather and equal to traditional breeding season), the second period from May to September 2003 (hot climate and is nearly equal to the summer breeding pause in Egypt). A number of 40 New Zealand White (NZW) and 30 V.L. breed) adult females at 6 months of age were used in the present study in the first period.

All rabbits were kept under similar managerial and hygienic conditions. The females were housed in individual cages of commercial type (60× 55× 40 cm). The cages were provided with feeders, automatic nipple drinkers and nest boxes (40× 35× 30 cm). The adult males were housed in individual cages as those of the females, but without nest boxes. The building was naturally ventilated and provided with side electric fans. They were provided a 16-hours light per day and a commercial rabbit feed (wheat bran, barley and soybean with 18% crude protein and 13% crude fibers and 2670 kcal/kg digestible energy. A semi-intensive program was adopted for the naturally mated does, the mating was effected 8-10 d after delivery or 18-20d after the non-fertile mating – the does which were not pregnant after the third mating were eliminated.

The following data were recorded: (a) number of parturitions (deliveries), (b) number of total and live rabbits born per delivery, (c) the weekly milk production by double weights (weight of the doe before and after suckling) for 21 and 28 days after delivery, (d)litter weight, (e)doe weight and (f) doe feed intake from delivery to weaning.

After the winter solstice, the experiment started from May to September (the summer breeding pause in Egypt).

The does selected in herdbook (November to April of the same year) had at least three littering and similar reproductive performance for NZW and V.L breeds. A total number of 33 adult females (18 NZW and 15 V.L. were equally divided into three groups, the first group served as control, while the 2nd and 3rd groups were orally supplemented dairly with CrP (9 and 18 μg/doe/day, respectively), during the summer months (May to September) where ambient air temperature and relative humidity were recorded daily.

Data were analyzed using a factorial design (2 breeds × 3 treatments) according to Snedecor and Cochran (1982). Significant differences among means of groups were compared using the multiple range test of Duncan (1955).

RESULTS AND DISCUSSION

Reproductive Efficiency

Breed Effect

Although doe weight at birth, and total litter size at birth were significantly higher ($p<0.01$) ($p<0.05$), respectively, in the V-line than NZW (Table 1), the alive litter size at birth was insignificant between breeds due to the increase in viability percentage at birth ($p<0.01$) for NZW (88%) than V-line (64%, Table 3).

Stillbirth was increased for V-line compared with NZW breed in summer season. This may be due to that NZW breed is more adapted to hot climate in Egypt compared with V-line. So data show that the variations between NZW and V-line breed was not significant for litter size, litter weight, viability percentage and milk yield at 21 and 28 days at age (Tables 2 and 3). However the reproductive performance of doe is higher for V-line in traditional breeding season compared with the NZW breed. This again confirms the finding of the susceptibility of V-line rabbits to the hot climate.

The V-line is synthetic line originated in 1982 at the Department of Animal Science, Univesidad Polilecnicia, Valencia, Spain. Litter size at weaning was considered as a criterion for selection in this line (Estany *et al.*, 1989).

Treatment Groups Effect

Supplementing CrP over three parities for females that had been retained from the first period of breeding (traditional breeding season) at a rate of 9 and 18 μg/doe/day for about three months during the beginning of summer resulted in greater total litter size, litter weight and viability percentages at birth ($p<0.01$) compared with control (Tables 1 & 3). Moreover, litter size, litter weight, viability percentages and milk yield at 21 and 28 days of age increased significantly ($p<0.001$) for does receiving oral CrP at levels of 9 and 18 μg/doe/day compared with control in NZW and V-line breeds (Tables 2 & 3).

The present study agrees with results obtained by Lindemann *et al.*, (1995a, b), Hagen *et al.*, (1998) and Trottier and Wilson, (1998) which showed large increases in litter size when supplementing the diets of sows and gilts with CrP. Also, Lindemann, (1996) reported that, the effects of Cr supplementation to sow positively affected total operational nitrogen balance by reducing nitrogen charges per pig. Improvements in either conception rate or litter size are associated with lower nitrogen charges per pig with the largest reduction occurring with the increased litter size. Improvements in both conception rate and litter size accelerate the reduction in nitrogen charge per pig.

Sahin *et al.* (2002a,b) also showed that supplementing vitamin C and chromium picolinate improved the performance of cold-stressed hens, and such a combination of supplement can offer a potential protective management practice in preventing cold stress-related losses in performance of laying hens. In addition, Sahin *et al.* (2002a) reported that, chromium supplementation can be considered a protection management practice in a quail diet, reducing the negative effects of heat stress.

Table (3) shows that, the viability percentage at birth for the second parity in the V-line was 30% in does which received high level CrP (18 μg/doe/day) in summer season. This is because we noted that rabbits had long periods of gestation and sometimes had to be injected with oxytocin in order to deliver, and that its kids were large and stillborn. Also, the amount of feed intake in this group was highly increased than the other groups but we could not analyze the data of feed intake due to the different situations of does at the same time of breeding.

In contrast, when CrP was supplemented at (9 and 18 μg/doe/day), was orally received daily for NZW and V-line does, it was noted that gestation length, total litter size, litter weight and viability percentage at birth were highly improved in the low level for V-line does, however this occurred at the high level in the NZW does during two parities (Table 1&3).

Nevertheless, milk yield at 21 and 28 days of age in NZW were move improved for females that received the low level of CrP compared with the high level group. Viability percentages were reduced at 21 and 28 days of age for NZW females given high CrP level, which could be attributed to the concomitant-reduction in milk yield. Therefore, litter size and litter weight at 21 and 28 days of age were higher in the low level group of CrP in NZW rabbits. Results were noted in the V-line rabbits (Tables 2&3).

It is worth noting that rabbits that received the additional low level of CrP during the two parities, the second parity recorded the highest reproductive efficiency for doe of either breeds compared with first parity or control. In this connection (Lindemann *et al.*, 1995b) has shown an increase in the magnitude of litter size response with increasing length of supplementation period. Also, Trottier and Wilson (1998) noted no response in the first litter after the initiation of supplementation, but found a large response in the subsequent litter. However, Hagen *et al.* (1998) did not find an increase in the magnitude of response with longer supplementation period.

Table (4) shows absence of data for reproduction in the control group for parity 3. This is because rabbits in the control groups did not become pregnant after mating or did not mate during August (high temperature and high relative humidity). Also, the does in V-line may show amelioration with CrP at low level, because the rabbits which had low level CrP gave the third parity during summer in V-line, but NZW does given high level CrP gave the third parity (Table 4), so data can't be analyzed in third parity.

The magnitude of the increase of total litter size, total litter weight at weaning and conception rate for the femakes given the low level of CrP is so large (76 kids, 29.3 kg and 60% respectively) compared with control in the V-line breed. However at the high level, the NZW does exhibited less increase (32 kids, 13.4 kg and 33%, respectively) compared with control during summer (Table 4).

Generally we can conclude that:

1. Supplementing chromium from chromium picolinate CrP in summer season had an ameliorating effect on reproductive traits of NZW and V-line does.
2. New Zealand White rabbits were more adapted to hot climate in Egypt compared with the V-line breed.
3. V-line does were more responsive to supplementation of CrP at low level (9 µg/doe/day), but at high level of CrP the does had longer periods of gestation and more stillbirths in summer.
4. NZW does exhibited higher magnitude of litter size and weight response at birth with increasing dose and length of supplementation period of CrP.

Table (1): Effect of supplementing of CrP during summer on reproductive performance of NZW and V-Line rabbit does ($\overline{X}$ ±S.E)

Trait / Treatment	Gestation Length (days)			Doe weight at birth (gm)			Litter size at birth			Litter weight at birth (gm)		
	NZW	V.L.	Overall	NZW	V.L.	Overall	NZW	V.L.	Overall	NZW	V.L.	Overall
Effect of breed (B)	30.9±0.2^{B}	31.7±0.2^{A}	31.3±0.1**	3273±66^{B}	3547±46^{A}	3426±41**	7.2±0.5^{B}	8.9±0.5^{A}	8.1±0.4*	385±32	453±38	417±ns
Effect of Treat. (T)			ns						*			***
Control	31.1±0.4	31.4±0.2	31.3±0.3	3493±121	3554±67	3522±70^{a}	5.8±0.7	7.0±0.5	6.3±0.5^{b}	247±45	217±67	236±36^{b}
CrP (9μg/doe/day)	31.2±0.4	31.2±0.3	31.2±0.2	3208±107	3615±54	3463±71^{ab}	6.8±0.8	10.6±1.0	9.2±0.8^{a}	443±51	537±43	499±34^{a}
CrP (18μg/doe/day)	30.4±0.2	32.2±0.2	31.4±0.2	3122±77	3487±78	3330±67^{b}	8.8±0.7	8.5±0.6	8.6±0.5^{a}	455±40	476±34	463±27^{a}
Interact B × T	***			ns			*			ns		
($\overline{X}$ of parity(P$_1$))	30.7±0.2	31.3±0.2	31.9±0.2^{A*}	3265±180	3495±69	3388±56ns	6.8±0.8	8.7±0.6	7.8±0.5ns	362±47	426±52	394±35ns
($\overline{X}$ of parity(P$_2$))	31.1±0.3	32.0±0.2	31.6±0.2^{b}	3285±115	3603±39	3470±61	7.8±0.6	9.0±0.8	8.5±0.5	419±39	503±51	456±32
Interact B × P	ns			ns			ns			ns		
Effect of parity (P)												
Control P$_1$	31.0±0.4	31.8±0.3	31.3±0.3	3370±167	3522±84	3437±98	4.8±0.7	7.5±0.5	6.0±0.6	229±62	149±0.7	199±40
Control P$_2$	31.3±0.7	31.0±0.0	31.2±0.3	3700±104	3596±127	3648±77	7.3±0.9	6.3±0.9	6.8±0.6	293±17	420±0.0	335±43
Crp (9 μg/doe/day) P$_1$	30.7±0.7	30.6±0.4	30.6±0.3	3216±130	3620±110	3469±107	6.0±1.0	10.2±1.5	8.6±1.2	372±84	527±65	468±56
Crp (9μg/doe/day) P$_2$	31.7±0.3	31.8±0.2	31.8±0.2	3200±202	3610±33	3456±101	7.7±1.2	11.0±1.5	9.8±1.1	514±35	540±65	531±41
Crp (18μg/doe/day) P$_1$	30.4±0.3	31.7±0.2	31.1±0.3	3190±116	3373±120	3296±8.8	9.2±1.0	8.3±0.8	8.7±0.6	489±53	491±37	490±31
Crp (18μg/doe/day) P$_2$	30.5±0.3	32.7±0.2	31.8±0.4	3037±96	3600±71	3375±106	8.3±1.1	8.8±1.0	8.5±0.7	411±61	400±0.0	409±47
Interact P × B × T	ns			ns			ns			ns		
Interact P × T			*			ns			ns			ns

ns : nonsignificant ** : significant at level P<0.01 * : significant at level P<0.05
Means in the same row with different superscripts significantly differ (P<0.05).

Table (2): Effect of supplementing CrP during summer season on litter size and weight from birth to 21 and 28 days of age for NZW and V-Line rabbit does ($\overline{X}$ ±S.E)

Trait / Treatment	Litter size from birth to 21 days			Litter size from birth to 28 days			Litter weight from birth to 21 days (gm)			Litter weight from birth to 28 days (gm)		
	NZW	V.L.	Overall	NZW	V.L.	Overall	NZW	V.L.	Overall	NZW	V.L.	Overall
Effect of breed (B)	5.2±0.4	5.8±0.5	5.5±0.4^{ns}	5.0±0.5	5.7±0.6	5.4±0.4^{ns}	1678±117	1662±131	1670±86^{ns}	2738±280	2610±224	2669±174^{ns}
Effect of Treat. (T)			**			**			**			**
Control	4.6±0.7	2.7±0.7	3.9±0.6^{b}	4.4±0.7	2.7±0.7	3.8±0.6^{b}	1547±102	1252±417	1437±159^{b}	2298±270	1701±315	2043±223^{b}
CrP (9µg/doe/day)	6.0±0.3	7.3±0.7	6.9±0.5^{a}	6.0±0.3	7.3±0.7	6.9±0.5^{a}	2042±191	1957±140	1987±109^{a}	3533±353	3231±261	3338±205^{a}
CrP (18µg/doe/day)	5.0±1.0	5.0±0.7	5.0±0.6^{b}	4.7±0.9	4.8±0.6	4.8±0.6^{b}	1511±208	1424±197	1471±139^{b}	2369±527	2136±293	2252±290^{b}
Interact B × T	ns			ns			ns			ns		
($\overline{X}$ of P_1)	5.3±0.6	5.4±0.8	5.4±0.5^{ns}	5.0±0.6	5.3±0.7	5.2±0.5^{ns}	1621±153	1440±150	1522±106*	2512±350	2259±246	2374±204^{ns}
($\overline{X}$ of P_2)	5.0±0.8	6.5±0.8	5.7±0.6^{ns}	5.0±0.8	6.5±0.8	5.7±0.6^{ns}	1759±190	2105±133	1919±125*	3190±441	3315±315	3258±251^{ns}
Interact B × P	ns			ns			ns			ns		
Effect of parity (P)												
Control P_1	4.0±0.6	2.0±0.0	3.2±0.6	3.7±0.7	2.0±0.0	3.0±0.5	1504±179	840±111	1239±193	2314±382	1395±120	1946±310
Control P_2	5.5±1.5	4.0±0.0	5.0±1.6	5.5±1.5	4.0±0.0	5.0±1.0	1613±38	2078±0.0	1768±157	2250±0.0	2318±0.0	2284±34
CrP (9µg/doe/day) P_1	6.5±0.5	7.4±1.1	7.1±0.8	6.5±0.5	7.4±1.1	7.1±0.8	1900±200	1768±175	1805±131	3058±746	2892±334	2939±284
CrP (9 µg/doe/day) P_2	5.7±0.3	7.3±1.0	6.6±0.6	5.7±0.3	7.3±1.0	6.6±0.6	2136±312	2194±183	2169±154	3850±325	3655±340	3739±233
CrP (18 µg/doe/day) P_1	5.6±1.0	4.8±0.9	5.2±0.6	5.2±1.0	4.6±0.7	4.9±0.6	1579±286	1353±226	1466±176	2413±644	1973±299	2193±343
CrP (18 µg/doe/day) P_2	3.5±2.5	6.0±0.0	4.3±1.7	3.5±2.5	6.0±0.0	4.3±1.7	1342±238	1780±0.0	1488±200	2150±0.0	2950±0.0	2550±400
Interact P × B × T	ns			ns			ns			ns		
Interact P × T			ns			ns			ns			ns

ns : nonsignificant ** : significant at level P<0.01 * : significant at level P<0.05

Means in the same row with different superscripts significantly differ (P<0.05)

Table (3): Effect of supplementing CrP during summer season on percent viability and milk yield at birth, 21 and 28 days of age for NZW and V-Line rabbit does ($\overline{X}$ ±S.E)

Trait / Treatment	%Viability at birth			%Viability from birth at 21 days			%Viability from birth at 28 days			Milk yield(g) at 21 days			Milk yield(g) at 28 days		
	NZW	V.L.	Overall	NZW	V.L.	Overall	NZW	V.L.	Overall	NZW	V.L.	Overall	NZW	V.L.	Overall
Effect of breed (B)	88±5^{A}	64±8^{B}	75±5**	67±6	60±5	64±4^{ns}	65±5	59±5	62±3^{ns}	188±20	177±14	183±12^{ns}	116±15	135±13	127±10^{ns}
Effect of Treat. (T)			**			**			**			***			***
Control	80±13	36±15	59±11^{b}	72±5	33±8	57±8^{b}	68±5	33±8	55±8^{b}	146±17	78±7	117±15^{b}	67±17	48±18	60±12^{b}
CrP (9µg/doe/day)	97±3	96±2	96±2^{a}	83±6	71±4	75±4^{a}	83±6	71±4	75±4^{a}	258±28	208±16	226±15^{a}	155±15	166±15	162±11^{a}
CrP (18µg/doe/day)	91±5	54±14	70±9^{b}	53±9	57±8	55±6^{b}	50±9	55±6	52±5^{b}	172±33	180±12	176±18^{a}	124±27	134±27	129±14^{a}
Interact B × T	ns			*			*			ns			ns		·
($\overline{X}$ of P_1)	96±4	75±10^{aa}	84±6*	71±6	58±7	64±5^{ns}	67±7	57±0	61±5^{ns}	192±28	163±16	176±15^{ns}	124±23	124±12	124±12^{ns}
($\overline{X}$ of P_2)	79±10	53±13^{bb}		62±9	64±4	63±5^{ns}	62±10	64±4	63±5^{ns}	183±28	206±25	193±19^{ns}	107±18	159±31	131±18^{ns}
Interact B × P	ns			*			*			ns				ns	
Effect of parity (P)															
Control P_1	90±10	38±16	67±13	74±7	25±0	55±13	68±8	25±0	51±11	157±23	76±7	123±24	68±29	63±21	66±17
Control P_2	62±31	33±33	48±21	68±10	50±0	62±8	68±10	50±0	62±8	115±15	90±0.0	106±12	65±15	20±0	50±17
Crp (9µg/doe/day) P_1	100±0	100±0	100±0	93±7	74±6	80±6	93±7	74±6	80±6	295±55	185±22	217±28	179±31	138±18	149±16
CrP (9µg/doe/day) P_2	93±7	92±2	92±3	76±8	67±5	57±6	76±8	67±5	54±5	233±28	237±12	235±13	140±10	201±9	175±14
CrP (18µg/doe/day) P_1	98±2	79±16	88±9	60±8	55±9	71±4	55±8	53±7	71±4	171±41	176±14	174±21	135±34	135±9	134±17
CrP (18µg/doe/day) P_2	82±12	20±19	50±10	36±24	67±0	46±17	36±24	67±0	46±17	175±75	200±0	183±44	100±50	130±0	110±31
Interact P × B × T	ns			ns			ns			ns				ns	
Interact P × T			ns			ns			ns			ns			ns

ns : nonsignificant ** : significant at level P<0.01 * : significant at level P<0.05

Means in the same row with different superscripts significantly differ (P<0.05).

Table (4): Overall litter weight, total litter size and conception rate resulting from each treatment.

Treatment	Control			9 µg /doe/day			18 µg /doe/day		
Traits	Conception rate (%)	Total litter size/group	Total litter weight/group/by kg	Conception rate (%)	Total litter size/group	Total litter weight/group/by kg	Conception rate (%)	Total litter size/group	Total litter weight/group/by kg
NZW									
Parity (1)	50%	11	6.942	30%	13	6.116	83%	25	12.060
Parity (2)	30%	6	4.500	50%	17	11.550	30%	10	4.300
Parity (3)	-	-	-	-	-	-	50%	14	8.520
Total	**40%**	**17**	**11.442**	**40%**	**30**	**17.666**	**54%**	**49**	**24.880**
V-Line									
Parity (1)	40%	4	2.780	100%	37	14.455	100%	20	9.863
Parity (2)	40%	4	4.636	80%	30	14.620	40%	8	5.900
Parity (3)	-	-	-	60%	16	7.650	-	-	-
Total	**40%**	**8**	**7.422**	**80%**	**84**	**36.725**	**70%**	**28**	**15.763**

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الملخص العربي

دراسة مدى تأثير اضافة بيكلونات الكرميوم على الكفاءة التناسلية لاناث الارانب النيوزلنيدى البيضاء وV-line خلال موسم الصيف

راوية صادق حامد
معهد بحوث الإنتاج الحيواني – الدقي

أجرى هذا البحث بمحطة بحوث الدواجن بالصبحية محافظة الإسكندرية والتابع لمعهد بحوث الإنتاج الحيواني بالدقي، وذلك لدراسة مدى تأثير بيكلونات الكرميوم على تخفيف العبئ الحراري أثناء الصيف وارتفاع نسبة الرطوبة، وكيفية الاستفادة منه في تحسين إنتاج أمهات الأرانب خلال أشهر الصيف وبذا يمكن إطالة موسم الإنتاج وزيادة العائد الاقتصادي للإناث خلال فترة الإنتاج.

لإجراء ذلك البحث تم اختيار ٣٣ أم من سلالتى النيوزيلندي وسلالة الـ V-line. وقد اختير ١٨ من سلالة النيوزيلندي، و١٥ من سلالة الـV-line، من خلال دفاتر التسجيل في نهاية موسم الشتاء لهذه الأمهات على أساس تقارب الأمهات في الكفاءة الإنتاجية على أن تتساوى في عدد البطون خلال فترة الشتاء. وفي شهر مايو من نفس الموسم تم تقسيم الأمهات داخل كل سلالة إلى ثلاثة مجموعات متساوية، الأولى كنترول، الثانية والثالثة داخل كل سلالة تم إعطائها بيكلونات الكرميوم (٩، ١٨ ميكروجرام/أنثى) عن طريق الفم بعد إذابتها في الماء وذلك يومياً خلال فترة التجربة من شهر مايو حتى شهر أغسطس (أثناء ارتفاع درجة الحرارة).

وقد أوضحت النتائج التالي :

١. الحجم الكلي للبطن(عدد الخلفة)، وزن الخلفة، ونسبة الحيوية عند الولادة قد زادت بفروق معنوية (مستوى ١%) بالنسبة للأمهات التي أعطيت بيكلونات الكرميوم مقارنة بالمجموعة الكنترول في كلا من السلالتين النيوزيلندي والـV-line، وكذلك حجم ووزن البطن والحيوية ونسبة إنتاج اللبن عند ٢١، ٢٨ يوم من الولادة زاد بفروق معنوية (عند مستوى ١%) لكلا السلالتين مقارنة بالكنترول.

٢. عند إضافة عنصر الكرميوم على صورة بيكلونات الكرميوم عند المستوى (٩، ١٨ ميكروجرام/ أنثى يومياً) وجد أن فترة الحمل وحجم ووزن الخلفة والحيوية عند الميلاد كانت أعلى إنتاجية لها في سلالة النيوزيلندي عند المستوى الأعلى من الإضافة، أما سلالة الـ V-line فكانت عند المستوى الأقل من بيكلونات الكرميوم ويرجع السبب في ذلك إلى أن بيكلونات الكرميوم ادت لزيادة استهلاك العليقة وأن إناث V-line أعلى في استهلاك العلف عن أمهات النيوزيلندي.

٣. الامهات داخل مجموعة الكنترول سواء في سلالة النيوزيلندي أو سلالة الـV-line لم تنتج بطن ثالثة خلال اشهر الصيف وذلك بسبب ارتفاع درجة الحرارة ونسبة الرطوبة أثناء شهر أغسطس لعدم استطاعة التلقيح وقلة الخصوبة لذا لم نتمكن من تحليل النتائج إحصائياً لنتاج البطن الثالثة على الرغم من ارتفاع الإنتاج للبطن الثالثة في المجاميع المعاملة وهذا يعني ارتفاع العائد الاقتصادي وتحسين الأمهات بالمعاملات.

٤. فى سلالة الـV-line وجد أن مجموع الزيادة الكلية فى حجم ووزن الخلفة عند الفطام فى مجموعة الارانب التى أعطى لها ٩ ميكروجرام كرميوم بيكلونيت لكل انثى كان ٧٦ أرنب كحجم خلفة، ٢٩,٣ كيلو جرام فى كوزن خلفة وذلك مقارنة بالكنترول حيث زادت نسبة الخصوبة ٦٠% فى معدل الحمل مقارنة بالكنترول، أما بالنسبة للسلالة النيوزيلندى فكانت بمقدار ٣٢ أرنب زيادة فى حجم الخلفة، ١٣,٤ كيلو جرام زيادة فى وزن الخلفة فى مجموعة الاناث التى اضيف اليها ١٨ ميكرو جرام كرميوم بيكلونيت مقارنة بالكنترول حيث زاد معدل الخصوبة ٣٣% فى معدل الحمل مقارنة بالكنترول وذلك فى نهاية التجربة خلال فترة الصيف.

٥. نسبة نفوق الخلفة المولودة في سلالة الـV-line زادت بفروق معنوية (١عند مستوى%) مقارنة بسلالة النيوزيلندي خلال أشهر الصيف وهذا ربما يكون راجع إلى أن سلالة النيوزيلندي أكثر تأقلماً لظروف البيئة المصرية عن سلالة الـV-line.