



PROTECTIVE ROLE OF SELENIUM AND VITAMIN E AGAINST THE DETRIMENTAL EFFECT OF SOME PESTICIDES ON FERTILITY AND SOME HORMONES OF CROSS BREED BULLS AT SHARKIA GOVERNORATE.

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ABSTRACT

The objective of this study was to clarify the adverse effect of deltamethrin and amitraz spraying on some hormones and semen characters of adult bulls and modulating this effect by using selenium and vit.E injections. A total of 18 cross breed bulls, aged 3-5 years old and 350-400 Kg. B.wt. at Sharkia Governorate, divided into six equal groups (3/each). The 1st was left without treatment as (control), the 2nd and 3rd were sprayed with deltamethrin (1/2000) and amitraz (2/1000), three times with 7 days apart. The 4th was injected s/c with 10ml of viteselen (selenium and vitamin E) one dose weekly for four successive weeks. The 5th and 6th were sprayed with deltamethrin and amitraz same like 2nd and 3rd groups but injected s/c with 10ml of viteselen one dose weekly during spraying four successive weeks. Blood and semen samples were collected at 1, 15 and 30 days post-spray and treatment for hormonal and semen analysis. The obtained results revealed that there was a significant reduction in T3, T4 and testosterone hormones as well as in sperm cell concentration, motility%, alive sperm %, where as there was elevation in total abnormalities in 2nd and 3rd groups at the 1st and 15th days after spraying in comparison to control. A finding which was contradictory to that observed with bull groups injected by selenium and vit. E (Gr 3-6). From these results, it could be concluded that, the spray of bulls by deltamethrin and amitraz induced adverse effects on the thyroid (T3 and T4) and testosterone hormones as well as semen picture. These adverse effects can be modulated by injection of bulls with viteselen during spraying.

KEY WORDS: Amitraz, Bull, Deltamethrin, Fertility, Pesticides

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1. INTRODUCTION

Pesticides are chemicals which are used to control insects, weeds and rodents [1, 24]. Prolonged exposure of animals to pesticide causes toxicities [23], immunosuppression, tumors, reproductive failure and economic losses [4, 7, 21, 28]. Deltamethrin is synthetic chemical pesticide which kills insects on contact and through digestion giving a quick knockdown effect [15, 18, 30]. It has been reported that male rats and bucks,

deltamethrin in doses of 1 or 2 mg/ kg b.w. for 65 days showed a decrease in the weight of genital organs and sperm motility associated with an increase in the dead sperms% and abnormal spermatozoa%. They also found a decrease in the plasma testosterone level [1, 16, 17, 34]. Histopathological findings of the testicular tissue showed necrosis in the seminiferous tubules with the absence of spermatogonial cells in rats and bucks

exposed to deltamethrin for 65 days with complete necroses of the seminiferous tubules and degeneration of leydig cells for 180 days. These were a decrease in the fertility index of mice dosed amitraz at different concentration [8]. Selenium and vitamin E have a metabolic role in the animal's body in addition to their antioxidant effects. They are incorporating in the defense against the oxidative stresses upon cells by detoxifying and inhibiting the formation of lipid hydroperoxides [10, 33]. Selenium and vitamin E are not only effective against oxidative damage alone, but also have a synergistic effect when used in combination [10]. The deficiency of selenium induced deterioration of the germinal epithelium of the testes and cessation of spermatogenesis [19, 20]. The present study was designed to evaluate the adverse effect of deltamethrin and amitraz spraying bulls on some hormones (T3, T4 and testosterone) and semen picture in cross breed bulls. In addition, the improvement of the deltamethrin and amitraz sprayed bulls by viteselen treatment to overcome the adverse changes that occur in the fertility of the sprayed bulls.

2. MATERIALS AND METHODS

2.1. *Animals*

A total number of 18 adult cross breed bulls-5 years old and 350-400Kg B. wt., kept in at private farm, at Sharkia Governorate, were used in this investigation.

2.2. *Drugs used:*

2.2.1. *Viteselen®*

Water soluble form was used in the present study. Each 1 ml of the preparation contains: 1.67 mg sodium selenite and 150 mg of Vit. E.

2.2.2. *Deltamethrin (Butox®):*

Was purchase from Intervet Company and the concentration of the spray is 1/2000.

2.2.3. *Amitraz:*

Was purchase from El -Nasr Company and the concentration of the spray is 2/1000.

2.3. *Experimental design*

The chosen bulls were divided into six equal groups (three/ each).the 1st, was left without spray or treatment as (control). The 2nd and 3rd were sprayed with deltamethrin (1/2000) and amitraz (2/1000) for 3 times with 7days a part respectively, the 4th not sprayed but was injected s/c with 10 ml of viteselen in one dose weekly for four successive weeks, the 5th and 6th were sprayed with deltamethrin and amitraz for three times with 7days a part and injected s/c with 10 ml of viteselen at one dose weekly during spraying for four successive weeks.

2.4. *Blood samples:*

Blood serum samples were taken from all bulls via the jugular vein puncture at days 1,15and 30 post spray. The serum was used for determination of T3 and T4 [5] and testosterone by RIA [35].

2.5. *Semen samples:*

Semen samples were collected from all bulls at days 30 and 60 post spray by using artificial vagina (18).Percentages of sperm motility, live sperms as well as the sperm cell concentration, and total sperm abnormalities were estimated [11].

2.6. *Statistical analysis:*

The obtained data were tabulated statistically analyzed [29].

3. RESULTS

The results of hormonal assay and semen evaluations in control and treated groups are illustrated in tables (1&2). The obtained results showed that, bulls sprayed with deltamethrin and amitraz (GR-2&3) revealed significant reduction in T3, T4 and testosterone at 1 and 15 day post spraying in addition to a significant reduction in sperm cell concentration, motility, alive sperm % and elevation in total abnormalities in comparison to the control group (GR-1). Bulls injected only with viteselen (GR-4) showed a significant increase in T3, T4 and testosterone hormone at 1 and 15 days post-treatment with a significant increase in sperm cell concentration, progressive motility and live sperm as well as decrease in total abnormality percentage at 1 and 30 days post treatment in comparison to the control group (GR-1). Bulls sprayed with deltamethrin and amitraz and injected with viteselen (GR, 5and6) showed a significant increase in T3, T4 and testosterone hormone on the 1 and 15 day post treatment with significant

increase in sperm cell concentration, progressive motility and live sperms as well as a decrease in total abnormality percentage on 1 and 30 days post treatment, compared to the control group.

4. DISCUSSION

The present study denoted that the, cross breed bulls sprayed with deltamethrin and amitraz revealed a significant decrease in thyroid (T3andT4) and testosterone on the day 1 and day 15 post spraying. A finding which come in accordance with that observed in bovine [26], rabbits [12], in rats [6] and in mice [31]. These finding might be explained on the fact that hypothyroidism caused by the exposure to insecticides induces reduction in secretion of gonadotropin releasing hormones and testosterone in rats [27].

In the present study, there was a significant increase in the mean values of thyroid hormones (T3 and T4) and testosterone in cross breed bull on Day 1 and Day15 post-treatment with viteselen. A finding which came in association to that obtained in goats [3].

Table 1 Effect of deltamethrin, amitraz and viteselen on some hormones in bulls

Groups	Days Post spray	T3 (ng/ml)	T4 (ng/ml)	Testosterone (ng/ml)
Non sprayed bull		183.17±5.48	4.69±0.42	0.87±0.13
	1	170.21±4.21*	1.98±0.31*	0.61± 0.10*
Deltamethrin (1:2000)	15	177.27±5.32	2.63±0.38	0.77±0.14
	30	4.83±184.5	4.06±0.59	0.80±0.12
	1	172.91±5.12**	1.93±0.28**	0.45±0.09**
Amitraz (2:1000)	15	178.06±5.94	2.95±0.78	0.62±0.07
	30	183.05±5.28	4.16±0.35	0.69±0.15
	1	193.29±414**	6.47±0.49*	0.83±0.12**
Viteselen	15	190.34±2.18*	5.89±0.37*	0.74±0.11*
	30	186.04±1.37	4.92±0.89	0.64±0.23
	1	187.38±2.87	5.09±0.48	0.67± 0.15
Deltamethrin and viteselen	15	185.70±1.73	5.01±0.59	0.65±0.16
	30	185.58±1.38	4.71±0.47	0.63±0.14
	1	187.94±2.69	4.89±0.58	0.65± 0.10
Amitraz and Viteselen	15	187.16±1.81	4.81±0.41	0.62±0.13
	30	186.15±1.25	4.80±0.75	0.63±0.10

*Significant at $P < 0.05$ and ** Significant at $P < 0.01$.

Table 2 Effect of deltamethrin, amitraz and viteselen treatment on Semen picture in bulls.

groups	Days Post spray	sperm cell conc. ($\times 10^6$)	Sperm motility (%)	Live sperm (%)	Abnormality (%)
Non sprayed bull		63.14 \pm 1.46	80.15 \pm 0.49	89.03 \pm 0.91	15.05 \pm 0.17
Deltamethrin (1:2000)	1	54.18 \pm 0.72*	71.27 \pm 0.92*	83.13 \pm 0.57*	25.03 \pm 0.92*
	15	57.83 \pm 0.91*	75.13 \pm 0.87*	86.28 \pm 0.68*	22.83 \pm 0.82*
	30	59.27 \pm 0.89	79.42 \pm 1.05	88.41 \pm 0.85	16.22 \pm 0.72
Amitraz (2:1000)	1	52.71 \pm 0.63**	70.38 \pm 0.89**	82.22 \pm 1.05**	23.06 \pm 0.75**
	15	58.17 \pm 0.63*	74.38 \pm 0.68*	85.14 \pm 0.81*	21.11 \pm 0.48*
	30	59.28 \pm 0.81	79.46 \pm 0.79	89.21 \pm 0.98	16.12 \pm 0.77
Viteselen	1	65.28 \pm 0.48*	87.13 \pm 0.59*	91.17 \pm 0.61*	8.05 \pm 0.42*
	15	63.95 \pm 0.32*	85.17 \pm 0.43*	89.86 \pm 0.73*	9.47 \pm 0.21*
	30	60.32 \pm 1.07	81.94 \pm 0.83	86.81 \pm 0.39	11.97 \pm 0.47
Deltamethrin and viteselen	1	60.46 \pm 1.15	82.08 \pm 0.57	88.45 \pm 0.79	10.05 \pm 0.78
	15	60.06 \pm 1.37	81.67 \pm 0.94	87.86 \pm 0.79	11.13 \pm 0.69
	30	59.42 \pm 1.51	81.14 \pm 0.62	87.57 \pm 0.59	11.48 \pm 0.27
Amitraz and Viteselen	1	62.03 \pm 1.91	82.21 \pm 0.82	87.16 \pm 0.82	12.03 \pm 0.46
	15	60.51 \pm 1.82	82.03 \pm 0.70	87.05 \pm 0.91	12.14 \pm 0.28
	30	59.70 \pm 1.93	81.00 \pm 0.93	86.19 \pm 0.78	12.29 \pm 0.21

*Significant at $P < 0.05$ and ** Significant at $P < 0.01$

Selenium acts as selenocysteine, which is a co-factor for hepatic enzyme type 1, 5-Iodothyronine-deiodinase and increases the ability of deiodination of T3 and T4 and increases the ability to degrade rT3 [13]. In addition, the testicular cholesterol content is the main precursor for the biosynthesis of testosterone hormone by the Leydig cells of the testis was increased in rabbits treated with selenium and vitamin E [2]. Concerning the semen picture, the obtained results revealed significant reduction in the sperm cell concentration, sperm motility, and live sperms with significant elevation in sperm abnormalities at day, 1 and day, 30 posts spraying by deltamethrin and amitraz. These findings can in agreement with that obtained in rabbits [12, 16] in rats [16, 32] and in mice [31]. The reduction in number of spermatozoa and motility in the present study may be due to the spray by deltamethrin or amitraz insecticide caused testicular lesions represented by moderate to severe degenerative changes of spermatogonial cells and partial arrest of spermatogenesis as showing in some

previous reports [14, 36]. Moreover, [21] recorded that the decrease in sperm cell concentration and motility% in rats may be attributed to the disruption of spermatogenesis by deltamethrin and amitraz which is preceded and caused by the impairment of the leydig cells function and the resultant drop in testosterone hormone in the testis of rats. Vitamin E and selenium increases the level of testicular zinc content [2] and zinc play an important role in establishment and maintenance of fertility due to enhancement of testosterone retention within the testes [25].

From the present work, it can be concluded that the spray of bulls by amitraz and deltamethrin induced many reversible alterations in thyroid hormone (T3 and T4), testosterone and the semen picture in these bulls, which returned to their normal values by viteselen (selenium and vitamin-E) injections during spraying. Viteselen minimize or reduce the alterations in fertility and hormonal changes induced by deltamethrin and amitraz.

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مجلة بنها للعلوم الطبية البيطرية

الدور الوقائي للسيلينيوم وفيتامين هـ ضد التأثير الضار الناتج عن الرش ببعض المبيدات الحشرية على الخصوبة وبعض الهرمونات في طلائق الأبقار الخليط في محافظة الشرقية

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الملخص العربي

صممت هذه الدراسة لتقدير مدى التأثير الضار الناتج عن الرش بالدلتامثرين والاميتراز على هرمونات الغدة الدرقية، هرمون الذكورة، وخصائص السائل المنوي في طلائق الأبقار الخليط. تم تقسيم عدد 18 من طلائق الأبقار الخليط. عمر من 3-5 سنوات في مزارع بمحافظة الشرقية إلى ست مجموعات كلا منها يحتوى على 3 طلائق. المجموعة الأولى بقيت بدون رش او معاملات دوائية (المجموعة الضابطة). وتم رش المجموعتين الثانية والثالثة بالدلتامثرين بتركيز (1ملى/2000) والاميتراز بتركيز (2 ملى/1000) ثلاث مرات بفواصل زمنية 7 ايام. المجموعة الرابعة تم حقنها تحت الجلد 1 ملى فيتاسللين (خليط السيلينيوم+فيتامين هـ) مرة واحدة أسبوعياً لمدة اربع أسابيع. المجموعتين الخامسة والسادسة تم رشهم بالدلتامثرين والاميتراز بنفس التركيز والنظام السابق ذكرة في المجموعتين الثانية والثالثة واثاء الرش تم حقنهم تحت الجلد باستخدام 1 ملى فيتاسللين مرة واحدة أسبوعياً لمدة اربع أسابيع متتالية. تم أخذ عينة دم من كل طلوقة لفصل المصل بعد الرش الثالثة بـ 1، 15، و 30 يوم وذلك لقياس مستوى بعض الهرمونات (التراى ايودوثيرونين - الثيروكسين - والتستوستيرون) وتم أخذ عينة سائل منوي من كل طلوقة عند، 30، و 60 يوم من الرش الثالثة وذلك لدراسة تأثير تلك المبيدات على صورة السائل المنوي. اظهرت النتائج إلى أن استعمال الدلتامثرين والاميتراز في رش الطلائق سبب نقص معنوي في هرمونات الغدة الدرقية (تراى ايودو ثيرونين والثيروكسين) والتستستيرون، تركيز الحيوانات المنوية، معدل الحركة وعدد الحيوانات المنوية الحية كما أدى إلى زيادة نسبة العيوب الشكلية في الحيوانات المنوية في حيوانات المجموعتين الثانية والثالثة بالمقارنة بالمجموعة الضابطة. بينما استعمال فيتاسللين في المجموعة الرابعة أدى إلى حدوث زيادة معنوية في هرمونات الغدة الدرقية والتستستيرون، تركيز الحيوانات المنوية ومعدل الحركة وعدد الحيوانات المنوية الحية كما أدى إلى نقص معنوي في نسبة العيوب الشكلية الكلية في الحيوانات المنوية بالمقارنة بالمجموعة الاولى. لوحظ ايضا إن استعمال فيتاسللين في حيوانات المجموعتين الخامسة والسادسة أدى إلى تحسن في تركيز هرمونات الغدة الدرقية و التستستيرون، تحسن في صورة السائل المنوي (تركيز الحيوانات المنوية، معدل الحركة، عدد الحيوانات المنوية الحية ونسبة العيوب الشكلية الكلية في الحيوانات المنوية). نستخلص من هذه الدراسة أن الرش بالدلتامثرين والاميتراز أحدثا تأثيرات سلبية على هرمونات الغدة الدرقية و هرمون التستستيرون و كذلك خصائص السائل المنوي في طلائق الأبقار الخليط ولكن استخدام السيلينيوم وفيتامين هـ أدى إلى تلافى تلك التأثيرات.

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