HEALTH AND PRODUCTION OF SHEEP EXPOSED TO TREATED WASTE WATER

Mohey A. Hassanain*; Wahid Mohamed**

** Dep. of Zoonotic diseases ** Animal Hygiene National Research Center – Giza – Egypt*

** Professor of Parasitology and Zoonotic Diseases ** Professor of reproduction and animal hygiene*

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Introduction

Proper treatment of municipal waste water and its ultimate safe reuse of discharge are essential to community health, Shilton et al., 2003; Grabow et al., 1999. Treated waste water (TWW) is used in the forms for agriculture purposes, as well as drinking for animals and birds must be safe and free from pathogens and with permissible limits of some heavy metals. Bolbol, 1992, Amahmid et al., 1999 and Shilton et al., 2003 illustrated some parasites in TWW and could be transmitted to man and animals; eggs of Ascaris, hook worm, Trichuris, Hymenolepis spp. and cysts of Giardia. Varadarajan et al., 1991 studied the impact of sewage disposal (non-treated waste water) on the hematological and biochemical parameters of dairy cows. They revealed that the erythrogram and total serum protein and globulin were altered. Horing and Scherping, 1995 suggested that biological treatment of waste water from dairy farm with ~1000 cows should be tested on a farm in Germany employing the new technological possibilities offered by the compact biological purification plants.

El-Tohamy et al., 1997 and Amal, 2003 studies the effect of exposure to lead (Pb) on the reproductive efficiency of buffalo-cows and female baladi goats. They concluded that long exposure of animals to lead affect the reproductive efficiency in the form of lower in percentage of conception rate and increase still birth % as well as increased service internal period to conceive, in addition to abortion. The kids from mothers suffered from reduced postnatal, viability, reduction in birth weight. Miranda et al., 2000 found that females accumulated more Cd, Cu, and Zn in kidneys than did males. Also they found that Zn blood levels in female were higher than in males, whereas, copper in liver was higher in males than in females. In the cases of arsenic and lead, no significance difference between males and females.

Material and methods

A) Treated waste water (Tww): It was obtained from Helwan treatment plant, south Cairo (final effluent). The final effluent was subjected to chemical, bacteriological and parasitological analysis (table1). Heavy metals were determined by atomic absorption spectrophotometer (Zeiss, PMQ3). The Tww was used in irrigation of land cultivated with green forage, as well as for ewes drinking.

B) Experimental animals: A total number of 2 sheep was used in the experiment and divided into 2 groups. The first treated group, consists of 15 ewes and 3 male, ram. The second control non-treated group consists of 7 ewes and one male, ram. The animals were housed loose inside semi open sheds. The ewes in the first group were drunk and fed on green forage irrigated with Tww. The rams were drink and fed on green forage irrigated with fresh Nile Water. The animals in control non-treated group were drunk and fed on green forage irrigated from fresh Nile water. Additional commercial balanced concentrate mixture ($^3/_4$ kg/head/day) were fed to all animals. The animals were exposed to the regime of feeding, mentioned before for 6 months before experiment of animal services. The beginning of the experiment, animals were synchronized using prostaglandin F2a (Lutalyse, Upjon) in 2 dose of 5 mg, 11 days apart and exposed to breeding.

C) Measured parameters: Number of services / conception, conception rate, gestation period, twining rate, lamb-birth weight, ♀ : ♂ sex ratio, lamb vigor (health state of lambs), lamb mortality rate and lambing-conception period (service interval).

D) Hematological evaluation: Blood samples were monthly collected from ewes and subjected to; erythrocytes count, P.C.V, Hb conc., MCV, MCHC, lencocytic and differential leucocytic count.

E) Faecal examination: monthly fecal examination of the experimental animals was done during the period of experiment. The data was computed and statistically analyzed for analysis of variance according to Snedecor and Cochran, 1980.

Results

The analysis of Tww revealed the presence of Fe, Mn, Zn, Cu, Pb, Ni, Cr, Co and Cd. The concentration of heavy metal was within acceptable limits. No parasites were detected and the bacterial count was within normal limit (Table 1).

The reproductive patterns of ewes exposed to Tww in drinking and feeding of green forage were displayed in table (2). The results revealed that the number of service/conception was 2.2 $\pm$ 0.3 and 1.66 $\pm$ 0.58 in first and second season of breeding respectively. In control group it was longer 3.01 ± 0.15. The conception rate percentage was 71.43 in first season and increased to be 8.7 in the second one, however it was 100% in control non-treated group. No significance difference in gestation period, Twining rate, lamb birth weight and lamb vigor in both treated and control group. The mortality percentage in new lambs was 14 in the first season and no mortality in second season and control group. Also the service-interval was longer (103.5 ± 4.95 days) than the control group (49 ± 3.7 days). The health state and behavior of pregnant and non-pregnant animals were normal in both treated and non-treated

control group. The parasitological examination revealed the infection of treated and non treated control animals by Trichostrongylus worms (300 eggs/gm feces) and Eimeria sppoocyst (750 oocysts / gm feces). The haemagram values of the experimental ewes were displayed in table (3) and revealed non-significant changes in RBSs count, hemoglobin concentration, PCV, MCV and MCHC. The leukogram values revealed significant lencocytosis with neutrophilia and eosinophilia in ewes during the second season of gestation. No significant changes were observed in other white blood cells.

Discussion

The present investigation revealed that ewes drank and fed on green forage irrigated by Tww had no adverse effect on fertility, pregnancy and produced birth except with high mortality in new lambs in the first season of breeding. On the other side Varadarajan et al., 1991 concluded that the use of non-treated waste water in dairy cows farms altered the blood pictures, total serum protein and globulin. The success of using Tww in farm animals with its ultimate safe use must be free from pathogens, particularly parasites and bacteria (Grabow et al., 1999, Amahmid et al., 1999 and Shilton et al., 2003). Also presence of heavy metals in Tww plays an important role reflected on animal and human health according to El-Tohamy et al., 1997 and Amal Riad, 2003.

Conclusion

It was concluded that the use of Tww with high technology of purification in feeding and drinking of ewes did not change its behavior and production and also the health status, physiological and reproductive patterns not altered.

Table 1. Heavy metals concentration ranges, parasites and bacterial count of examined TWW.

Sam-ple	pH	Element mg/liter									Para-sites	Bacterial		
		Fe	Mn	Zn	Cu	Pb	Ni	Cr	Co	Cd		TN*	Fecal E. coli	Strept fecalis
tww	7.1	0.018-0.025	0.01-0.04	0.18-0.28	0.020-0.022	0.040 -0.046	0.060 -0.0	0.030-0.031	0.010-0.020	0.022-0.025	-	40000	1400	110

*TN: Total number of organism per/liter.

Table (2): Reproductive parameters of ewes exposed to treated waste water (TWW):

Parameter	First season	Second season	Control group
No. services/conception	2.2 ± 0.3	1.66 ± 0.58	3.01 ± 0.15
Conception rate %	71.43	85.7	100
Gestation period (days)	148.25 ± 2.06	150.33 ± 1.25	155 ± 1.07
Twining rate %	57.1	51.1	59.1
Lamb-birth weight (kg)	2.08 ± 0.54	2.1 ± 0.31	2.86 ± 0.23
♀ : ♂ sex ratio	1 : 1.5	1.4 – 3	1.1 : 3.3
Lamb vigor 1-5	3.2 ± 0.84	3.5 ± 0.57	4.5 ± 0.66
Mortality rate %	14	-	-
Service-intervals (days)	-*	103.5 ± 4.95	49 ± 3.7

* The experimental ewes were serviced for the first time.

Table (3): Mean Haemogram and leukogram values of ewes fed on green forage irrigated with treated waste water (Tww) during first and second season of breeding.

Parameter	First season	Second season	Control group
Hemoglobin conc. (gm/dl)	12.1 ± 0.66	12.4 ± 0.31	12.9 ± 0.19
PCV	36.7 ± 0.41	39.9 ± 0.91	34.2 ± 0.2
RBS count (10^6 ml)	5.55 ± 0.9	5.06 ± 0.71	5.66 ± 0.51
MCV	69.12 ± 0.41	70.85 ± 0.77	66.42 ± 0.40
MCHC	32.97 ± 0.9	33.07 ± 0.44	34.38 ± 0.91
Total WBS count (10^3/ml)	8.91 ± 0.91	11.10 ± 0.53*	7.71 ± 1.22
Neutrophil (10^3/ml)	5.21 ± 0.17	6.60 ± 0.44*	3.91 ± 0.69
Lymphocytes (10^3/ml)	3.17 ± 0.27	3.93 ± 0.	2.41 ± 0.85
Monocytes (10^3/ml)	0.81 ± 0.77	0.89 ± 0.85	0.86 ± 0.44
Eosinophils (10^3/ml)	0.29 ± 0.29*	0.41 ± 0.44*	0.15 ± 0.12

* $P < 0.05$.

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