



Effect of Using Magnetic Water on Milk Yield and Its Composition of Zaraibi Goats

Osama A.M. El-Kheshen¹, M. R. M. El-Mahdy², Youssef H. Hafez¹, Tamer M.M. Hassan^{2*}

¹Animal Production Research Institution, Agricultural Research Center, Dokki, Egypt.

²Department of Animal Production, Faculty of Agriculture, Benha University, Egypt.

*Corresponding author: tamer.mohamed@fagr.bu.edu.eg

Abstract

The aim of this study was to investigate the effects of using magnetic water on Zaraibi goat's milk yield and its composition. Thirty Zaraibi goats in the last third of pregnancy average live body weight of 32.33 kg and aged 3-4 years old were assigned into three groups (each of ten animals). The animals were divided into three groups as follow: first group was drinking tap water (control). Second group was drinking magnetic water (T₁, 2000 gauss). Third group was drinking magnetic water (T₂, 4000 gauss). Milk yield was recorded monthly during 6 months of lactation season and milk samples were analyzed every month; for milk components milk fat, protein, lactose, and solids not fat using Milko-Scan 133B. Results showed that there were significant differences between groups in daily and total goats milk yield. Second treatment (T₂, 4000 gauss) had a higher daily and total milk yield than the first treatment (T₁, 2000 gauss) and the control group. Similar findings were recorded for goat's milk composition (fat, protein, total solids and solids not fat %) while, there had no significant differences on lactose percentage due to using magnetic water. Second treatment (T₂, 4000 gauss) had a higher milk composition than the first treatment (T₁, 2000 gauss) and the control group except lactose %. It can be concluded that drinking magnetic water (T₁, 2000 gauss and T₂, 4000 gauss) can be increases effectively the daily, total Zaraibi goat's milk yield and its composition except lactose percentage without negative effects.

Keywords: Magnetic water, Milk yield, Milk composition, Zaraibi goats.

Introduction

Small ruminants contribute to the economy of many farmers in developing countries, including Egypt **Al-Tamimi (2007)**. One of the most promising goat breeds in Egypt is the Zaraibi goat, which is mainly found in the northeastern Nile Delta. The Zaraibi goat is characterized by its large head, Roman nose, lower jaw, and long, drooping ears. Horns are often absent in both sexes. It is also characterized by a very variable body color, from cream to red, brown, or black or a mixture of them, sometimes with white spots. The body is also covered with short hair (**Shaht et al., 2007 and Galal et al., 2005**). Water is the basic and main element of all living organisms, as it represents 98% of all molecules in the animal body. Water is the element of life because of the important roles it plays within the living organism. It is an essential component in the circulatory system. It also regulates body temperature, transports oxygen, hormones, antibodies, and dissolves enzymes, in addition to a role in the digestion and absorption of feed and disposal of waste, so it was important to pay attention to water and its quality and find ways to improve it. There are many studies that confirm the

ability of magnetic water to enhance the ability of cells to transport water. This is due to increasing the permeability of the cell membrane. This process increases the speed of cells getting rid of toxic metabolic substances. This may occur due to the regulation and management of osmotic balance and concentration ions between outside and inside cells. In addition to the positive effect of magnetized water on cell hydration, which may reach 20%, which is a very good indicator of the body's general health (**Mahdi, 2016; El-Sabroun and El-Hanoun 2019; Lee et al., 2019 and Al-Bayar et al., 2020**). Scientists have used the magnetic field in many fields, including the medical field, to treat some diseases (**Bodrova et al., 2020**), including the industrial and agricultural fields. The magnetic field is used in its various branches of irrigation water and plant cultivation (**Abdulraheem and Jameel, 2021; Fayed et al., 2021**); in animal and poultry (**Radha and AL-Sardary, 2021**) and in fish production (**Abdelkhalek et al., 2021**). Among these branches, we are interested in animal production, and one of its uses in this field is to treat the water that the animal drinks with a magnetic field to improve water quality by passing water through a magnetic field, which works to change many of the chemical and physical

properties of water and thus improves the quality of water (Ali *et al.*, 2014). Studies have shown the important role that the magnetic field plays in improving water by changing its various properties, as is more evident in unconventional water such as salt water and acidic water, which makes the use of magnetized water one of the solutions to water shortage in arid and semi-arid regions (Dokhani, 2020). The use of the magnetic field to treat water improves the quality and properties of water, which positively affects the improvement of the animal's immune system and increases its weight. It also increases the yield of milk production and its components in Zaraibi goats, Awassi sheep, and dairy cattle. It also improves the blood picture, biochemical parameters, and antioxidant status in humans and animals. It also reduces the environmental impact in livestock (Ebrahim and Azab, 2017; Lindinger, 2021). The aim of this study is to investigate the effect of drinking magnetic water on Zaraibi goat's milk production and its composition.

Materials and Methods

This study was done during the period from January 2021 to August 2021 at Animal Production Research Station, Sakha, Kafer El-Sheikh

Governorate, belongs to Animal Production Research Institute (APRI), Agriculture Research Center (ARC), Ministry of Agriculture in cooperation with the Department of Animal Production, Faculty of Agriculture, Benha University, Egypt.

Experimental animals and management:

Thirty Zaraibi goats in the last third of pregnancy average live body weight of 32.33 kg and aged 3-4 years old were assigned into three groups (each of ten animals). The animals were divided into three groups as follow: first group was drinking tap water (control), second group was drinking magnetic water (T₁, 2000 gauss) and third group was drinking magnetic water (T₂, 4000 gauss). The experiment continued from the last third of pregnancy until the end of the milking season during 6 months of lactation. Feeding has been adjusted according to body weight and different production stages according to NRC (2007). Samples from Egyptian clover (EC), Egyptian clover hay (ECH) and concentrate feed mixture (CFM) were analyzed according to AOAC (1995) for ether extract (EE), crude protein (CP) and ash percentages while, crude fiber (CF) was measured using the method of Van Soest *et al.* (1991). Chemical composition of experimental diet illustrated in table 1.

Table 1. Chemical composition of experimental diet (% on DM basis).

Items	Concentrate feed mixture (CFM)*	Egyptian clover (EC)	Egyptian clover hay (ECH)
DM	92.2	18	89.84
OM	95.43	89.10	89.34
CP	14.45	13.16	12.72
CF	12.95	26.85	27.44
EE	2.50	2.84	2.80
NFE	65.53	46.25	46.38
Ash	4.57	10.90	10.66

* Concentrate feed mixture (CFM) was consisted of: 40% wheat bran, 30% ground yellow corn, 24% undecorticated cotton seed meal, 3% cane molasses, 2% lime stone and 1% common salt.

Preparation of magnetized water:

A sample of water was taken from each group for analysis to see the effect of the magnetic field on it and the analysis was done through the National Water Research Center. Two permanent magnets were borrowed from (Nefertari Biomagnetic Comp., Egypt) 2000 Gauss and 4000 Gauss. The intensities of its magnetic field was confirmed by checking it with a Gauss meter. The magnet was installed before the animal drinking basin tap of the experimental animals the water was constantly available to the animal and the water was changed every 12 hours.

Milk sampling and analysis:

Milk production was recorded biweekly from the second week of birth (after colostrum milk) until the end of the milking season during 6 months of lactation, individually in the morning and evening for

each group, by blocking half of the udder each time in an interchangeability manner. Then the entire udder was recorded from the second week of birth (after colostrum milk) until the end of the milking season (182 day). Milk samples were taken for analysis every month; all samples were analyzed for milk components milk fat, protein, lactose, total solids and solids not fat using Milko-Scan 133B.

Statistical analysis:

The obtained data in this study were statistically analyzed using general linear models (GLM) procedure of SAS (2000).

$$Y_{ij} = \mu + T_i + e_{ij}$$

Where: Y_{ij}= the observation of milk yield and its composition for the ij Zaraibi goats; μ= general mean, common element to all observations; T_i= the fixed effect due to the ith treatment with magnetic water (i=1, 2, 3 while, 1= control, 2= 2000

Gauss, 3= 4000 Gauss); e_{ij} = random error associated with the individual observation and assumed to be (N,IND) and (0, σ^2). Tests of significance for differences between means were carried out according to **Duncan (1955)**.

Results and Discussions

Goat's milk yield:

Table 2 shows milk yield and its composition in the lactation season of Zaraibi goats and a significant increase ($P<0.01$) in the second (T₂, 4000 gauss) and first (T₁, 2000 gauss) treatments over the control group in daily milk yield (881.64, 870.9 and 778.79 grams/day, respectively) and in total milk yield (160.46, 158.50 and 141.74 kg, respectively) during the lactation season.

Table 2. Milk yield and its composition of Zaraibi goats during the lactation season.

Parameter	Control	T ₁ (2000 Gauss)	T ₂ (4000 Gauss)	SEM*	Significant
	Mean	Mean	Mean		
Daily milk yield, grams/day	778.79 ^b	870.9 ^a	881.64 ^a	20.85	**
Total milk yield, kg	141.74 ^b	158.50 ^a	160.46 ^a	3.79	**
Milk composition (%):					
Fat	3.40 ^b	3.98 ^a	4.08 ^a	0.11	***
Protein	2.83 ^b	3.14 ^a	3.26 ^a	0.06	***
Lactose	4.38	4.39	4.44	0.04	NS
Total solids	11.33 ^b	12.24 ^a	12.51 ^a	0.15	***
Solids not fat	7.93 ^b	8.26 ^a	8.43 ^a	0.07	***

^{a,b} Within rows means bearing different superscripts differ significantly at $P<0.05$. *SEM= Standard error of mean. NS= non-significant, **= $P<0.01$, *** = $P<0.001$.

These results agree with **Yacout et al. (2015)** indicated that treating water with a magnetic field (1200-3600 Gauss) in Zaraibi goats at ages 2.5-3.5 years led to a significant ($P<0.05$) increase in the amount of milk produced, as T₂ (3600 Gauss) was significantly higher compared to T₁ (1200 Gauss) (1.049 vs. 1.011 kg/day), and T₁ was significantly ($P<0.05$) higher compared to the control (1.011 vs. 0.902 kg/day). On other species, **Mustafa and Muhammed (2023)** indicated that a study they conducted on the use of magnetic water using Awassi ewes aged 2 years old that treatment with the magnetic field of water, showed an improvement in the milk yield in T₃ (6000 Gauss), followed by the T₂ (4000 Gauss), then T₁ (2000 Gauss), the least being T₀ (well water) (0.735, 0.640, 0.533 and 0.429) respectively, where the increase in milk post-partum was significant for T₃ compared to T₁ and T₀. The increase was also significant in T₁ compared to T₀, while it was not significant between T₁ and T₂ and between T₂ and T₃. Also, **Ghoneim et al. (2020)** found that milk production and its composition was increased when they drink magnetic water intensity (1200 gauss) compared to tap water on Egyptian buffaloes. Where the results showed a significant ($P<0.01$) increase in milk production from magnetic drinking water of buffaloes starting from 6 to 14 weeks of lactation compared to the tap water. The results also showed a significantly higher ($P<0.05$) in

protein, fat, lactose, total solids (TS), and solids not fat (SNF) in magnetic drinking water compared to the tap water of buffaloes.

Goat's milk composition:

Furthermore results indicated that there was a significant increase in goat's milk fat percentage in the second and first group versus the control during the lactation season (4.08, 3.98 vs. 3.4%, respectively) as showed in Figure 1. These results agree with **Yacout et al. (2015)** indicated that treating water with a magnetic field (1200-3600 Gauss) in Zaraibi goats led to an increase in milk composition in treated water (1200-3600 Gauss) compared to the control, where the milk fat percentage in T₂ (3600 Gauss) was significantly higher compared to T₁ (1200 Gauss) (3.94 vs. 3.78%) and T₁ was significantly higher compared to the control (3.78 vs. 3.19%). On other species, **Ghoneim et al. (2020)** found that milk production and composition increased when drinking magnetized water intensity (1200 Gauss) compared to tap water on Egyptian buffalo cows within 4-5 valences as the percentage of fat was significantly higher ($P<0.05$) in the magnetized drinking water compared to tap water (7.53% vs. 7.06%). On contrary, **Sargolzei et al. (2009)** showed that treatment with magnetized water (1200-3600 gauss) had no significant effect on milk composition of Saanen goats.

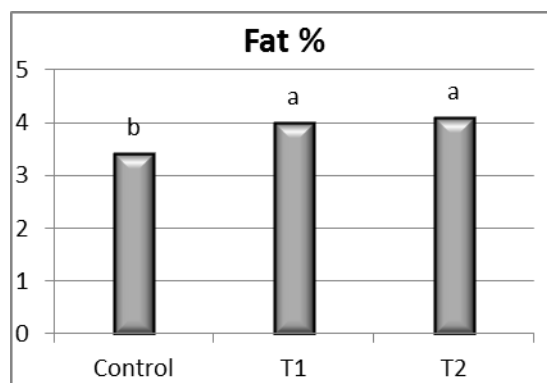


Figure 1. Effect of drinking magnetic water on milk fat percentage of Zaraibi goat

Results showed that there was a significant increase in the protein percentage in the second and first group versus the control during the lactation season (3.26, 3.14, 2.83 %, respectively) as observed in Figure 2. Similar results recorded by **Ghoneim *et al.* (2020)** who found that milk protein percentage was significant increase ($P < 0.05$) when drinking magnetized water intensity (1200 Gauss) compared to tap water (4.47% vs. 4.37%) in Egyptian buffalo cows within 4th and 5th parity. Also, **Yacout**

et al. (2015) indicated that treating water with a magnetic field (1200-3600 Gauss) led to an increase in milk composition in treated water(1200-3600 Gauss) compared to the control, the milk protein percentage was 3.23,3.19 and 3.03%, for T₂ (3600 Gauss), T₁ (1200 Gauss) and control group, respectively.



Figure 2. Effect of drinking magnetic water on milk protein percentage of Zaraibi goat

Results showed that there was no significant increase in the lactose percentage in the second and first groups and the control during the lactation season (4.44, 4.39, 4.38 %, respectively) as obtained in Figure 3. These results agree with those reported by **Shamsaldain and Al Rawee (2012)** who showed that magnetic water (1000 Gauss) had not significant effect in level of lactose (4.32 vs. 4.17%) of Awassi

sheep at ages 3- 4 years. On contrary, **Yacout *et al.* (2015)** indicated that treating water with a magnetic field (1200-3600 Gauss) led to an increase in milk composition in treated water(1200-3600 Gauss) compared to the control, the milk lactose percentage was (4.98, 4.97and 4.56%, for T₂ (3600 Gauss), T₁ (1200 Gauss) and control group, respectively.

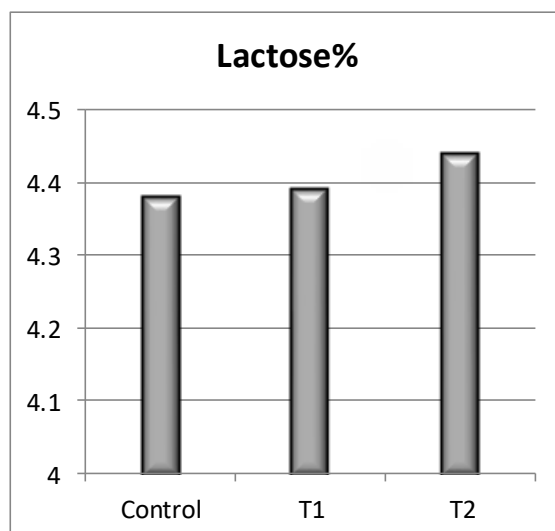


Figure 3. Effect of drinking magnetic water on milk lactose percentage of Zaraibi goat

Results showed that there was a significant increase ($P < 0.001$) in the total solids percentage in the second and first group compared to the control during the lactation season (12.51, 12.24, 11.33 %, respectively) as showed in Figure 4. The present results are in good agreement with the findings of **Yacout *et al.* (2015)** who indicated that treating water with a magnetic field (1200-3600 Gauss) in led to an increase in milk composition in treated water

(1200-3600 Gauss) compared to the control, the milk total solids percentage was 12.88, 12.66 and 11.51%, for T₂ (3600 Gauss), T₁ (1200 Gauss) and control group, respectively. On other species, **Ghoneim *et al.* (2020)** who found that the total solids had a significant increase ($P < 0.05$) when drinking magnetized water intensity (1200 Gauss) compared to tap water (17.63 vs. 17.04) in Egyptian buffalo cows within 4th -5th parity.

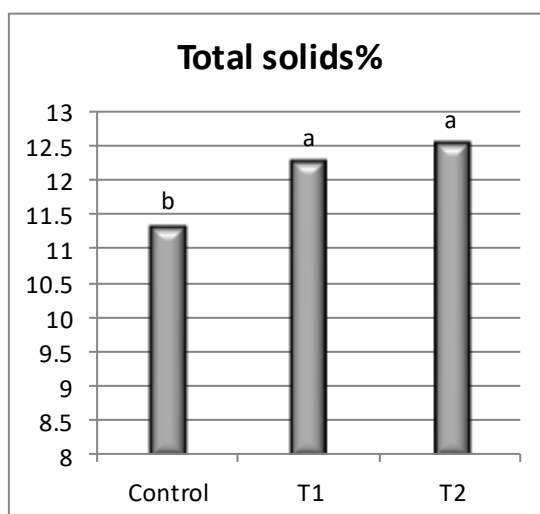


Figure 4. Effect of drinking magnetic water on milk total solids percentage of Zaraibi goat

The results of the lactation season showed a significant increase ($P < 0.001$) in solids not fat for the second and first treatments compared to the control (8.43, 8.26, 7.93 %, respectively) as observed in Figure 5. Results partially agree with, **Yacout *et al.* (2015)** indicated that treating water with a magnetic field (1200-3600 Gauss) in Zaraibi goats led to an increase in milk composition in treated water (1200-3600 Gauss) compared to the control, the milk solids not fat percentage was 8.88, 8.94 and 8.32 %, for T₂ (3600 Gauss), T₁ (1200 Gauss) and

control group, respectively. On other species, **Shamsaldain and Al Rawee (2012)** showed that drinking Awassi sheep at ages 3- 4 years magnetic water (1000 gauss) comparing with tap water had significantly ($P < 0.05$) increased total milk yield (117.19 vs. 83.65 kg). It also caused a significant ($P < 0.05$) increase in milk fat % (6.90 vs. 5.77%), milk protein% (8.08 vs. 4.31%), and milk total solids % (17.23 vs. 14.86%), while not significant effect was found in level of lactose% (4.32 vs. 4.17%).

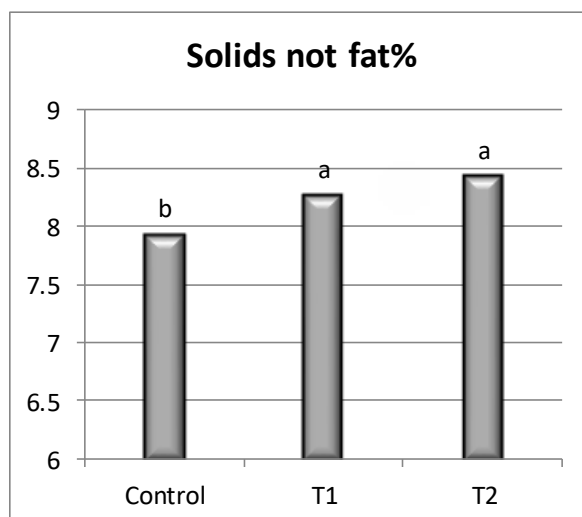


Figure 5.Effect of drinking magnetic water on milk solids not fat percentage of Zaraibi goat.

The improvement in milk production and its composition may be due to the improvement in water quality, which subsequently improved food digestion, assimilation and absorption (Yacout *et al.*, 2015). These results agree with Ghoneim *et al.* (2020) found that milk production and its composition was increased when they drink magnetic water intensity (1200 gauss) compared to tap water on Egyptian buffaloes. Where the results showed a significant ($P < 0.01$) increase in milk production from magnetic drinking water of buffaloes starting from 6 to 14 weeks of lactation compared to the tap water on Egyptian buffaloes. The results also showed a significantly higher percentage ($P < 0.05$) in protein, fat, lactose, total solids (TS), and solids not fat (SNF) in magnetic drinking water compared to the tap water of Egyptian buffaloes. Furthermore Ebrahim and Azab, (2017) reported that animals consumed magnetized water showed an increase in the amount of milk produced, such as Zaraibi goats, ewes, Awassi sheep, and dairy cattle, as well as an increase in milk protein and fat %

Conclusion

It can be concluded in the present study that drinking magnetic water (T1, 2000 gauss and T2, 4000 gauss) can be improving effectively the growth performance, carcass traits, blood metabolites and immunity than drinking tap water without negative effects on Zaraibi kids.

References

- A.O.A.C.(1995).Association of Official Analytical Chemists.Official Methods of Analysis, 15th Ed., Washington, DC.
- Abdelkhalek, N.; Abdelhamid, A.; Rezk S. and Mabrouk, M. (2021).Effects of magnetic water and feeding rate on growth performance and immunity of Nile Tilapia

(Oreochromis niloticus). Mansoura Vet Med J. 22(3) : 97-104.

- Abdullaziz, I. A.; Metwally, . A. M.; El-Sayed, M. S. and Ali, . H. A. (2022) The Potential Impact of magnetically treated water on the performance of Baladi goats. Alexandria Journal of Veterinary Sciences, 72 (2), 9-22. doi:10.5455/ajvs.23948
- Abdulraheem, L. H. and Jameel, W. (2021).Effects of magnetic treatment of different qualities of irrigation water on plant growth. IOP Conference Series: Earth and Environmental Science, Vol. 779, Fifth International Scientific Conference on Environment and Sustainable Development, 1-2 June 2021, Baghdad, Iraq & Istanbul, Turkey.
- Abdul-Sahib, Muaad.(2016). Study the impact of utilization magnetically treated water with different intensities on carcass specification and productive performance of male lambs Awassi. Euphrates Journal of Agriculture Science·Vol. 8, no. 4, pp.51-56.
- Abdullah, S. (2023). The Effect of Feeding Schedule on Carcass Component Weight of Female Kacang Goats. Jurnal Penelitian Pendidikan IPA, 9(8), 5987-5991.
- ALAbbasy, E. Gh. and Shihab, O. H. (2020)Effect of using magnetic water in some physiological and biochemical parameters in the local male lambs.scienceadvances,vol 17, no 131,part i
- Al-Bayar, M. A.; Mahmood, R. M.; &Saieed, A. Y. (2020).Magnetic treated water, reality and applications: A review. Plant Archives, 20(2), 732-737.
- Al-hafez, M.A.K.; Alkhashab, A.Th. and Almteoty, M. S. (2015). Effect of the magnetic water on some physiological and biochemical characteristics of blood in Awassi rams. Kirkuk University Journal For Agricultural Sciences, 6(1), 62-71.

- Ali, Y.; Samaneh, R.; Zohre, R. and Mostafa, J. (2014).** Magnetic Water Treatment in Environmental Management: A Review of the Recent Advances and Future Perspectives. *Current World Environment*, 9(3), 1008–1016.
- Al-Mafarji, D. A. and Alsaadi, S. A. (2023).** A comparative Study of the Productive Traits of Drinking Thermally Stressed Awassi Ewes with Tap and Well Water before and after their magnetic treatment. *Kirkuk University Journal For Agricultural Sciences*, 123-129.
- AL-Obaidy, M. H. A. (2014).** Effect of Drink Magnetic Water on Some Quantity Characteristics of Awassi Lambs Carcasses. *Alexandria Science Exchange Journal*, 35(JULY-SEPTEMBER), 296-301.
- Al-Rashid, M. and Baz, A. A. (2015).** Effect of magnetic water in some productive parameters of Awassi lambs. *Journal of Al-Baath University* 37(7).
- Al-Tamimi, H. J. (2007).** Thermoregulatory Response of Goat Kids Subjected to Heat Stress. *Small Ruminant Res.* 71 (1), 280–285.
- Bodrova, R.A.; Kuchumova, T.V.; Zakamyrdina, A.D.; Yunusova, E.R. and Fadeev, G. Yu. (2020).** The effectiveness of low-frequency magnetotherapy in patients with pneumonia caused by COVID-19. *Questions of balneology, physiotherapy and physical therapy.* Vol. 97 (6): 11-16 .
- Budisatria, I. G. S.; Panjono, N. N.; Udo, H. M. J. and Atmoko, B. A. (2021).** The productivity comparison between Bligon and Kejobong goats in Indonesia, based from on-farm and on-station research. *J. Anim. Health Prod*, 9(3), 262-270.
- Dokhani, S. (2020).** Impact of the magnetic treatment on some of the unconventional waters' properties. *Desert Ecosystem Engineering Journal*. 9(5), 41–52.
- Doumas, B. T.; Baysa, D. D.; Carter, R. J.; Peters, T. and Schaffer, R. (1981).** Determination of serum total protein. *Clin. Chem.*, 27:1642.
- Drabkin DL. and Austin JM. (1932).** Spectrophotometric constants for common haemoglobin derivatives in human, dog and rabbit blood. *J Biol Chem*;98:719-733.
- Duncan, D.B. (1955).** Multiple Ranges and Multiple F- test. *Biometric*, 11: 1- 42.
- Ebrahim, A. S. and Azab, A. E. (2017).** Biological Effects of Magnetic Water on Human and Animals: Review Article. *Biomedical Sciences*, 3(4), 78-85.
- El-Sabrou, K. and El-hanoun, A. (2019).** Does magnetized drinking water influence poultry's health and production? *World's Poultry Science Journal*, Vol. 75 (3): 411 – 416.
- Fayed, M. H.; Ghanem, H. G.; Sheta, M. H. and Ali, A. A. (2021).** Effect of magnetized water on water use efficiency of spinach under north sinai conditions. *Misr J. Ag. Eng.*, 38 (2): 137 – 154.
- Galal, S.; Ferial Abdel Rasoul ; Anous, M.R. and Shaat, I. (2005).** Small Ruminant Breeds in Egypt. In Iñiguez, Luis. *Characterization of Small Ruminant Breeds in West Asia and North Africa.* Vol 2. North Africa .International Center for Agricultural Research in the Dry Land (ICARDA), Aleppo, Syria, pp. 140-193
- Henry, J.B. and Todd, S.D. (1974).** Clinical diagnosis and measurement by laboratory methods, 16th Ed., W.B. Saunders and Co., Philadelphia., P.A.P. 260.
- Jiaxun, X.; Qiujiang, L.; Changjiang, Z.; Shimin, L. and Rong, P. (2020).** Magnetized Water Improves Digestion and Growth of Lambs. *Animal Husbandry and Feed Science*, 12(2), 1-7.
- Koracevic, D.; Koracevic, G.; Djordjevic, V.; Andrejevic, S. and Cosic, V. (2001).** Method for the measurement of antioxidant activity in human fluids. *Journal of clinical pathology*, 54(5), 356-361.
- Lee, H. S.; Yap, A. C. W.; Ng, C. C.; Mohd, N. S. and Loo, J. L. (2019).** Increased electron density and dissolved oxygen level in water through magnetic effect. In *IOP Conference Series: Earth and Environmental Science* (Vol. 257, p. 012010). IOP Publishing.
- Lindinger, M. I. (2021).** Structured water: effects on animals. *Journal of Animal Science*, 99(5), 1–11.
- Mahdi, A. S. (2016).** The effect of magnetized treated water on some blood parameters and total weight in Cyprus shame male. *International Journal of Advanced Research.*, Vol. 4(2): 760-766.
- Masri, M.; Al-Dabbagh, A.; AL-Rashid, M. (2019).** Protein Digestive Change Associated With Magnetic Water Use in Friesian Calves. *Journal of Hama University* vol.2 (5):19-26.
- NRC (2007).** Nutrient requirements of small ruminants: sheep, goats, cervids and New World camelids. National Research Council of the National Academies Press, Washington DC, USA.
- Patton, C. J. and Crouch, S. R. (1977).** Blood urea estimation. *Anal. Chem*, 49, 464.
- Radha, G. H. and Al-Sardary, S. Y. T. (2021).** Effects of Using Magnetic Water on Egg Quality and Biochemical composition in Commercial Layers. *IOP Conference Series: Earth and Environmental Science*, Vol. 761, international collaborative conference of modern agricultural technologies- 2020 24-25 March 2021, Iraq.
- Rasmiaa H. M. El-Sabagh (2022).** Effect of management systems on productive and

- reproductive traits in ruminants. M. Sc., Agric. Coll. Univ. of Benha-Egypt.
- SAS (2000).** SAS/STAT Guide: Statistics, SAS Institute Inc., Cary, N.C., USA.
- Schalm, O. W.; Jain, N. C. and Carol, E. I. (1975).** Veterinary Heamatology. 3rd Edition. Lea & Fibinger, Philadelphia. 144 – 167.
- Shaht, I.; Mabrouk, M.; Raheem, A. and Hamed, A. (2007).** Estimates of heritability and correlation for milk and growth traits in zaraibi goat. Egyptian Journal of Animal Production, 44(2), 161-171.
- Shastri, G. A. (1983).** Haematological values of cows of Assam. Veterinary clinical Pathology. GBS Publishers and distributors, Delhi.
- Tadesse, D.; Urge, M.; Animut, G. and Mekasha, Y. (2016).** Growth and carcass characteristics of three Ethiopian indigenous goats fed concentrate at different supplementation levels. SpringerPlus, 5, 1-8.
- Trinder, P. (1969).** Enzymatic colorimetric determination of glucose in serum, plasma or urine. Ann. Clin. Biochem., 6:24.
- Van Soest, P.J.; Robertson, J.B. and Lewis, B.A. (1991).** Methods for dietary fiber, neutral detergent fiber and non-starch polysaccharides in relation to animal nutrition. J. Dairy Sci., vol. 74, p. 3583-3597.
- Yacout, M.H.; Hassan, A.A.; Khalel, M.S.; Shwerab, A.M.; Abdel-Gawad, E.I. and Abdel-Kader, Y.I. (2015).** Effect of Magnetic Water on the Performance of Lactating Goats. J. Dairy Vet. Anim. Res., 2(5): 00048.
- Young, D. S. (1990).** Effects of drugs on clinical laboratory tests. Third edition. 3:6-12.

تأثير إستخدام الماء الممغنط على محصول اللبن ومكوناته في الماعز الزرايبي

أسامة أحمد محمد الخشن¹ ومحمود رياض محمود المهدي² ويوسف حسين حافظ¹ وتامر مسعد محمد حسن²

¹ معهد بحوث الإنتاج الحيواني - مركز البحوث الزراعية - الدقى - جمهورية مصر العربية

² قسم الانتاج الحيوانى - كلية الزراعة - جامعة بنها - جمهورية مصر العربية

هدفت هذه الدراسة إلى معرفة تأثير استخدام الماء الممغنط على محصول اللبن ومكوناته في الماعز الزرايبي. تم تقسيم ثلاثين من الماعز الزرايبي في الثلث الأخير من الحمل بمتوسط وزن حي 32.33 كجم وعمر 3-4 سنوات إلى ثلاث مجموعات (كل منها عشرة حيوانات). تم تقسيم الحيوانات حسب الوزن إلى ثلاث مجموعات على النحو التالي: المجموعة الأولى الكنترول كانت تشرب الماء العادى. المجموعة الثانية كانت تشرب الماء الممغنط (T₁, 2000 جاوس). المجموعة الثالثة كانت تشرب الماء الممغنط (T₂, 4000 جاوس). تم تعديل التغذية وفقاً لوزن الجسم ومراحل الإنتاج المختلفة وفقاً NRC (2007). تم تسجيل محصول اللبن شهرياً خلال 6 أشهر من موسم الحليب وتم أخذ عينات اللبن للتليل كل شهر؛ تم تحليل جميع العينات لمكونات اللبن الدهن والبروتين واللاكتوز والمواد الصلبة الكلية والمواد الصلبة غير الدهنية باستخدام Milk-Scan 133B. أظهرت النتائج وجود فروق ذات دلالة إحصائية بين المجموعات في محصول لبن الماعز اليومي والإجمالي. أظهرت المعاملة الثانية (T₂, 4000 جاوس) أعلى محصول يومي وإجمالي للبن الماعز من المعاملة الأولى (T₁, 2000 جاوس) ومجموعة الكنترول. كما سجلت نتائج مماثلة لتركيب لبن الماعز (نسبة الدهن والبروتين والمواد الصلبة الكلية والمواد الصلبة غير الدهنية) بينما لم تكن هناك فروق معنوية في نسبة اللاكتوز بسبب استخدام الماء الممغنط. أظهرت المعاملة الثانية (T₂, 4000 جاوس) أعلى تركيب للبن الماعز من المعاملة الأولى (T₁, 2000 جاوس) ومجموعة الكنترول باستثناء نسبة اللاكتوز. ويمكننا أن نستنتج أن شرب الماء الممغنط (2000 جاوس و 4000 جاوس) يمكن أن يزيد بشكل فعال من محصول لبن الماعز الزرايبي اليومي والإجمالي وتركيب اللبن باستثناء نسبة اللاكتوز بدون تأثير سلبي.