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The accuracy of genomic breeding value for production trait in Iranian Holstein Dairy Cattle using parametric and non-parametric methods

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Abstract

Genomic Selection (GS) is a tool for prediction of breeding values for quantitative traits. For a successful application of GS, accuracy of predicted genomic breeding value (GEBV) is a key issue to consider. Here we investigated the accuracy of GEBV in 345 genotyped Iranian Holstein cattle. The study was performed on milk, fat, protein yield and somatic cell count. Four methods G-BLUP, Bayes B, Reproducing kernel Hilbert Spaces (RKHS) and Neural Networks (NN) were used to predict genomic breeding values and their accuracies. The GEBV accuracies varied between 0.39 for somatic cell count to 0.73 for fat yield. Bayes B gave the highest accuracies among methods. Bayes B and non- parametric methods tended to produce inflated predictions (slope of the regression of GBV on EBV greater than 1). However, in all traits, lower estimates of MSE were obtained using G- BLUP. Bayes B regression model are of interest for future applications of genomic selection in this population, but further improvements are needed to reduce deflation of their predictions.

Keywords: genomic selection, molecular markers, parametric and non-parametric prediction, selection accuracy.

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Promoter analysis of effective genes in negative energy balance in dairy cows

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Abstract

This study was done to gain insights into transcriptional regulation of negative energy balance (NEB) assoctiated genes. Overexpressed genes in NEB were identified using microarray and RNA-seq data and promoter analysis of these overexpressed genes was applied to identify novel transcription factors. Moreever, STRING database was used to construct a regulatory network of identified transcription factors. The results of the gene expression analysis revealed that eight genes in severe NEB are more frequent and significant ($P<0.05$) in comparison to the mild NEB. Promoter analysis showed that promoters of overexpressed genes are enriched in putative binding sites for 19 transcription factors. This group included known NEB-associated transcription factor (NF-κB), and a number of transcription factors (such as SP1, ZBP89, NFI, Zf9, MYC, ZBTB7A, FOXF2 and KLF6) that had not been previously reported to be associated with NEB. Based on the present results, 18 new effective candidate trsnacription factors introduced in this study can provide new information to gain a better understanding of the regulatory network involved in NEB.

Keywords: gene expression, gene network, microarray, RNA-seq, transcription factors.

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The comparison between two nutrition models, NRC (2001) and CNCPS V.6.1, in estimating nutritional requirements of fresh cows

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Abstract

In order to compare the precision of predictions of NRC (2001) and CNCPS models, 17 Holstein fresh cows were assigned in a randomized complete block design to a balanced diet with NRC (2001) and CNCPS software. The predicted DMI, energy allowable milk and protein allowable milk by both models were compared with observed values. The precision of the predictions of models was evaluated by calculation of R^2, mean bias and root mean square prediction error (RMSPE). Both models predicted DMI lower than the observed values ($P<0.01$). The mean bias, RMSPE and R^2 were 2.22, 2.84 and 0.48 for NRC (2001) and 3.18, 3.99 and 0.52 for CNCPS, respectively and CNCPS predicted the DMI 20 percent lower than the observed value. The observed milk production was 29.78 kg/d. predicted energy allowable milk by NRC (2001) and CNCPS were 25.68 and 22.32 kg/d, respectively. Predicted protein allowable milk with NRC (2001) and CNCPS were 25.80 and 28.37 kg/d, respectively and NRC (2001) predicted the milk production 14 percent lower than observed value. Given the importance of DMI in fresh cows seems NRC (2001) has more precision compared to CNCPS for estimating nutritional requirements.

Keywords: dry matter intake, energy allowable milk, Holstein cow, mean bias, MP allowable milk.

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The investigation of digestion and fermentation of diets containing different parts of Subabul tree (*Leucaena leucocephala*)

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Abstract

The digestibility and fermentation parameters of the diets containing leaf, pod and seed of the Subabul tree in sheep was determined by using two steps digestion and gas production (GP) methods. The experimental diets consisted of 0.0 (control), 25, 50, 75 and 100 percent of the leaf, pod and seed of the Subabul tree that were replaced with alfalfa in diets of sheep. Diets containing 50 percent seed of the Subabul had higher GP compared to the control diet ($P<0.05$). The highest true digestibility of organic matter in Subabul leaf was belonged to diet contains 100 percent leaf. The diet contain 100 percent had the highest partitioning factor (PF) and microbial biomass efficiency ($P<0.05$) compared to other levels of the Subabul pod. The digestibility of DM, NDF and ADF of diets contain the pod of the Subabul tree for all levels were less than control ($P<0.05$). There are no significant differences between digestibilities of NDF and ADF of diets contain up to 75 percent the leaf of the Subabul tree and others diets. Digestibility of DM, NDF and ADF was more than control diet ($P<0.05$) by increasing the amount of the seed of the Subabul tree in the diets (75 and 100 percent of the seed of the Subabul). According to the results, the leaf and seed of the Subabul can be replaced up to 100 percent with alfalfa in the diets of sheep without any negative effect on fermentation and digestion. The nutritional value of sheep diets can be improved by replacing the alfallfa with Subabul tree seeds.

Keywords: chemical composition, digestibility, gas production, microbial biomass production, partitioning factor.

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Effect of physical form of diet on performance of fattening Holstein male calves

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Abstract

In order to study the effect of dietary physical form on the fattening performance of Holstein male calves, an experiment was conducted in Animal Science Research Institute of Iran in 2011. The experimental diets were formulated and prepared with two physical forms including total mixed ration (TMR) and densified complete feed block (DCFB). In a completely randomized block design, with two treatments and four blocks (initial weight of the animals), 24 Holstein male calves were fed with either of the TMR or DCFB rations. During a five month feeding trial, the animals fed ad-libitum where feed intake, body weight gain and feed conversion ratio were recorded. The average feed intake were 8.1 and 8.4 kg for TMR and DCFB that were significantly ($P<0.05$) different between the treatments. The initial body weights were respectively 226 and 221 kg for the animals received TMR and DCFB, but the final weights were 361 and 373 kg, respectively that was higher ($P<0.05$) for the animals received DCFB. The average daily gain were 901 and 1016 g for TMR and DCFB respectively, which were significantly different ($P<0.05$) between the treatments. Feed conversion ratio were 9.0 and 8.3 for TMR and DCFB respectively that was significantly ($P<0.05$) lower in DCFB treatment. It is concluded that utilization of complete feed block improved feed intake, body weight gain and feed conversion ratio in fattening calves.

Keywords: fattening calves, performance, physical form of feed.

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Effects of thyroxin *in ovo* injection and post hatch arginine feed supplementation on performance and cold tolerance acquisition in broilers

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Abstract

Two experiments were conducted to evaluate the effects of thyroxin *in ovo* injection and post hatch arginine feed supplementation on performance and cold tolerance acquisition in broilers. In experiment 1, a total of 2400 hatchings eggs were randomly assigned to four treatments: Positive controls (intact or pricked with a needle), Negative control (intact egg), injected with distilled water and injected with thyroxin. In experiment 2, a total of 240 day old male broiler chicks from the intact and injected with thyroxin treatment groups were assigned in a 2 × 2 factorial trial based on completely randomized design, with two level of injection (non-injection or injected with 65ng of thyroxin) and two type of diet (without Arginine or 5 kg/ton Arginine). In order to induce ascites in chicks, all of the chicks were exposed to 15°C from 14 to 42 d of age. The results showed that the second grade chicks and yolk sac weight were decreased ($P<0.05$) in thyroxine by *in ovo* injection. Ascites mortality rate, packed cell volume percent and red blood cell count were decreased ($P<0.05$) by thyroxine injection and arginine supplementation. In conclusion, these results show that *in ovo* injection of thyroxin and arginine feed supplementation improves the performance during exposure to cold environments.

Keywords: arginine, hatchability, incubation, *in ovo* injection, performance.

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Effect of soybean isoflavones on growth performance, blood parameters and mineralization of tibia bone in broiler chickens

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Abstract

This study was conducted to investigate the effect of dietary soy isoflavones (ISFs) on growth performance, blood parameters and tibia Ca and P content of broiler chickens. A total of 240 as-hatched day-old Ross 308 chicks were used in a completely randomize design with four treatments (0 (control), 25, 50 and 100 mg/kg of ISF), three replicates and 20 birds per each replicate for a period of 42 days. Using ISF in the diet without any effect on feed intake improved the chicken's weight gain and feed conversion ratio ($P<0.05$). Diet containing 50 and 100 mg ISF/kg had no effect on tibia ash content, but increased tibia Ca and P contents ($P<0.05$). pH value of gizzard and cecal digesta were decreased by adding ISF to diet ($P<0.05$). The sera concentrations of total cholesterol, triglyceride, LDL- and VLDL-cholesterol decreased in birds fed on diets containing ISF ($P<0.05$), whereas the concentration of HDL-cholesterol increased ($P<0.05$). Addition 50 and 100 mg/kg of ISF to diet increased the gross profit per chicken and cost of diet, respectively ($P<0.05$). According to the findings, supplementation of 50 mg ISF/kg of broiler diet is recommended.

Keywords: bone calcium, digesta pH, economic efficiency, genistein, serum cholesterol.

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Performance, ascites susceptibility and economic yield of broilers under intermittent mash-pellet feeding program

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Received: 2 December 2014 **Accepted: 27 February 2015**

Abstract

Effect of intermittent mash-pellet feeding programs on broilers performance, ascites susceptibility and economic yield was studied using 480 broilers in six treatments and five replicates of 16 chicks per pen were used in a completely randomized design. Treatments including: 1. Mash feed, 2. Heated-mash feed, 3. Mash feed in starter and grower and pellet feed in finisher, 4. Mash feed in starter and pellet feed in grower and finisher, 5. Pellet feed, 6. Grinded-pellet feed. Pellet feeding increased the feed intake and body weight gain and improved the feed conversion ratio, although the ascites susceptibility increased ($P<0.01$). Mash feeds decreased the body weight gain and increased the feed conversion ratio ($P<0.01$). Feeding pellet in finisher resulted in the same feed conversion ratio with feeding pellet for whole period or grower and finisher periods, however feed conversion ratio in pellet fed birds was better than mash fed birds ($P<0.01$). Feeding pellet for whole period is necessary to obtain maximum feed intake and body weight gain. Feeding mash feed in the first four weeks or whole period reduced the ascites susceptibility ($P<0.01$). The ascites susceptibility increased by increase in pellet feeding length ($P<0.01$). Feeding pellet diets reduced the feed cost for a kg live weight production and the increased gross profit compared to mash diets ($P<0.05$). In order to use the benefits of pellet feed and avoid high mortality rates and ascites susceptibility, it is recommended to start with mash feed and fed pellet in growing and finisher periods.

Keywords: broiler, feed form, mash, pellet, performance.

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The impact of Acidifier in the diet of broiler chickens grown in high stocking densities on growth performance, immune system and blood metabolites

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Received: 23 June 2015 **Accepted: 25 August 2015**

Abstract

Effect of GLOBACID® acidifier in different stocking densities on performance and blood metabolites was examined using 576 one-day broiler chickens Ross 308 in a completely randomized design with 6 treatments and four replications for each treatment through a (3 × 2) factorial arrangement with three levels of stocking densities (14, 16 and 18 chicks per square meter) and two levels of GLOBACID® acidifier (zero and one kg per each ton of feed). The lowest feed intake was seen in 18 stoking density treatment which fed one kg of acidifier in the ration and this treatment was significantly different with other treatments ($P<0.05$). Feed intake was significantly lower in broilers which received acidifier compared with others that did not receive acidifier ($P<0.05$). Increasing the density from 14 to 18 birds per square meter increased feed conversion ratio ($P<0.01$). Birds that received acidifier had lower feed conversion ratio than others ($P<0.05$). Feeding diets containing acidifier lead to a reduction in glucose and antibody titers against SRBC and an increase in cholesterol and triglyceride in broilers blood plasma ($P<0.05$). The interaction between stocking densities and acidifier on body weight and blood metabolites was not significant. Therefore, using acidifiers in high stocking densities have some advantageous in broiler performance.

Keywords: acidifier, broiler, performance, stocking density, weight gain.

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Determination nutritional value of Purslane powder and evaluation of its effects in diet on laying hens performance

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Abstract

Two experiments were conducted to evaluate the nutritional value of Purslane powder and its effects on performance, egg quality and reproductive system parameters of laying hens. One hundred and twenty laying hens (Leghorn, Hy-Line W-36) were used in a completely randomized design with four treatments and five replicates. Hens received diet supplemented with different levels of Purslane powder (0, 1, 2 and 3 percent) for 8 weeks. The results of these expriments showed that gross energy, crude protein, ether extract and crude fiber contents of Purslane samples were 2921.67 (Kcal/Kg DM), 22.28 (percent), 3.99 (percent) and 9.47 (percent) of DM, respectively. The AME and TME values of Purslane powder were 1864.70 and 1956.08 Kcal/Kg DM, respectively. Performance parameters of the laying hens were not affected by inclusion different levels of dietary Purslane powder in the diet. Shell strength, shell thickness, egg yolk color, ovary and oviduct weights, the number of large yellow follicles and the weight of largest follicle showed significant increase ($P< 0.05$) in treatments containing Purslane as compared to control group. According results of this experiment, use of Purslane powder in laying hens diet can improve quantitative traits of eggs and reproductive parameters. Therefore, Purslane powder can be used in the diets of laying hens at three percent.

Keywords: egg yolk color, haugh unit, leghorn, metabolizable energy, ovarian follicle, shell strength.

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Effect of *Mentha piperita* and *Melissa officinalis* powder on performance and digestibility of fat and protein of broilers subjected to heat stress

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Abstract

This study was conducted to investigate the effect of *Mentha piperita* (PP) and *Melissa officinalis* (MP) powder on performance, apparent digestibility of fat and protein and blood parameters of broiler chicks subjected to heat stress. 200-day-old male Ross broiler chicks were assigned to a completely randomized design with five dietary treatments and four replicates. The experimental treatments were: 1. Control group (diet without feed additive), 2. Diet supplemented with 0.5 percent PP, 3. Diet supplemented with 1 percent PP, 4. Diet supplemented with 0.2 percent MP and 5. Group supplemented with 0.4 percent MP. The experimental diets were offered to the chicks from 25 to 42 day of age. During the experiment, the birds were kept at 34°C ± 2 for 8 hours (9.00 to 17.00). The diets supplemented by *Mentha piperita* and *Melissa officinalis* powder had not significant effect on feed intake, but higher body weight gain (BWG) and lower feed conversion ratio (FCR) observed in the birds fed diet supplemented with one percent of PP. Apparent digestibility of dry matter and crude fat were not affected by the dietary treatments, but the digestibility of protein was increased ($P<0.05$) in birds fed on diet supplemented with one percent of PP. Dietary inclusion of PP and MP had no effect on blood parameters. It could be concluded that addition of PP at the level of one percent of broilers diets during heat stress, improve protein digestibility and growth performance.

Keywords: broiler, heat stress, *Melissa officinalis*, *Mentha piperita*, performance.

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The effect of lemon pulp and organic acids on performance, intestinal morphology and blood parameters of broilers

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Abstract

For determination the effect of lemon pulp levels and organic acid premix (globacid) on performance, carcass traits, immune system, biochemical parameters and intestinal morphology of broilers, 288 Ross broilers were used in 3×2 factorial arrangement with three levels of lemon pulp (0, 1.5 and 3 percent) and two levels of globacid (0 and 0.1 percent) in a completely randomized design with six treatments, four replicates and 12 birds per each replicate from 10 to 42 days of age. Feeding birds with diets cantaining lemon pulp and organic acid premix increased the amount of weight gain and final live weight ($P<0.05$). Lemon pulp and organic acid had not effect on carcass traits, whereas the thigh percentage increased in bidrs fed on diet containing lemon pulp ($P<0.05$). Using three percent lemon pulp and lemon pulp with organic acid premix increased cripts depth of jejenum ($P<0.05$). Dietary lemon pulp and organic acids had not significant effects on immune level and biochemical parameters. It could be concluded that using lemon pulp up to 3 and 0.1 percent organicof acid improve performance, carcass traits and intestinal morphology of broiler chicks

Keywords: broiler, immune status, intestinal morphology, lemon pulp waste, performance.

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Dietary effects of cinnamon, turmeric and carnation powders on performance, morphological changes of intestine and blood serum oxidation status of broilers

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Abstract

To investigate the effect of cinnamon, turmeric and carnation powders on growth performance, carcass characteristics, morphological and pH changes of intestine and blood serum oxidation status in broilers, 450 unsexed Ross 308 day-old broiler chicks were randomly allotted in a completely randomized design with six treatments, five replicates and 15 birds per each replicate, for 42 days. The broilers were fed either a basal diet (without feed additive as control) or basal diet supplemented with 3 g/kg of cinnamon, turmeric and carnation powders and 0.6 g/kg of their mixture (2 g/kg of each) as well as 0.5 g/kg of flavophospholipol. Feed intake, weight gain and FCR as well as carcass characteristics were not affected by experimental diets. The jejunal villi height to crypt depth ratio was turned out to be significantly higher in the diet containing the mixture of cinnamon, turmeric and carnation than those of control, flavophospholipol and cinnamon diets ($P<0.05$). In addition, the feed additives appeared to reduce the pH of duodenal digesta compared to the control ($P<0.05$). Moreover, blood serum MDA of chickens fed basal diet and diet containing carnation was significantly higher than the other experimental diets ($P<0.05$). In conclusion, turmeric powder alone or in combination with cinnamon and carnation can be considered as an appropriate alternative to antibiotics in broiler diets, and used for improving the pH and morphological traits of intestine as well as blood serum oxidative stability.

Keywords: broilers, feed intake, malondialdehyde, medicinal herbs, villi height.

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Effect of anise seed (*Pimpinella anisum* L.) on performance, immune system, antioxidant activity and blood estrogen level in broiler chickens

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Abstract

This study was carried out to evaluate the effect of different levels of anise seed on the performance, immune system, antioxidant activity and blood estrogen level of broiler chicks. A total of 192 day -old Ross 308 broilers were trained for 42 days in a completely randomized design with four treatments, four replicates and 12 birds per each replicate. Treatments were included the levels of zero (control), 0.3, 0.6 and 0.9 percent of anise seed in diet. SRBC was injected at day 28 and blood samples were collected from chickens at days 35 and 42 of rearing. Dietary anise supplementation had no positive effect on feed intake and weight gain of broilers. In starter period, the chicks fed by 0.3 percent of anise seed, had the least feed conversion ratio ($P<0.05$). However, anise seed levels had no positive effects on feed conversion ratio in grower and total rearing period. Anise seed caused the higher antibody titer against SRBC in day 35 of rearing ($P<0.05$). The cellular immunity did not improve by anise seed levels in broilers. The 0.3 percent of anise seed, caused the higher total antioxidant capacity of blood plasma than control chicks ($P<0.05$). The blood serum estrogen level was reduced in 0.3 and 0.6 percent, but increased in 0.9 percent of anise seed ($P<0.05$). Generally, however the anise seed dose not improves performance traits and cellular immunity of broilers, but increse the primary humeral immunity and total antioxidant capacity of chicken.

Keywords: anise seed, antioxidant activity, estrogen, immune system, performance.

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The effect of silver nanoparticles coated on clinoptilolite on performance, liver enzymes and blood lipid concentrations of broiler chickens

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Abstract

This experiment was conducted to evaluate the effect of silver nanoparticles coated on clinoptilolite on performance traits, liver enzymes and blood lipid concentrations to use 375 Cobb 500 broiler chickens in completely randomized design with five treatments and five replicates and 15 birds to each replicate. The use of silver nanoparticles coated on clinoptilolite improved feed conversion ratio compared with the control treatment ($P<0.05$). Dietary treatments had no significant effect on the feed intakes and weight gain ($P>0.05$). The use of silver nanoparticles coated on clinoptilolite decreased alkaline phosphatase and alanine amino transferase level in serum ($P<0.05$). Silver nanoparticles coated on clinoptilolite be can decreased cholesterol, triglycerides, low density lipoprotein, very low density lipoprotein concentration and increased high density lipoprotein concentration in broiler chickens ($P>0.05$). In conclusion, the results of this study showed that silver nanoparticles coated on clinoptilolite can be considered as a growth and health promoters as well as according to the results of liver function enzymes and blood lipids prevent liver damages during rearing period in broiler chickens.

Keywords: blood lipid, broiler chickens, clinoptilolite, liver enzyme, performance, silver nanoparticles.

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Effect of zinc nano-complex on bull semen quality and pregnancy outcome

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Abstract

This study aimed to investigate the effect of different concentration of zinc nano-complex on bull spermatozoa quality and pregnancy outcome after freeze-thawing process. Ejaculates were collected from four Holstein bulls, twice a week during four weeks. Semen samples diluted with Bioxcell extender containing zero (Control), 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3} and 10^{-2} M of zinc nano-complex. The samples were then freezed-thawed after 72 hours. Motility of sperm was analyzed using computer assisted sperm analysis. The highest and lowest concentrations of zinc nano-complex along with control group were analyzed for the DNA fragmentation, malondialdehyde (MDA) concentration, mitochondrial activity, and pregnancy outcomes. The proportion of the total and progressive motile spermatozoa and the percentage of spermatozoa with fragmented DNA were not different among the groups. However, the groups containing 10^{-6} and 10^{-2} M zinc nano-complex had a lower level of MDA concentration and higher activity of mitochondria. Moreover, the pregnancy outcome was not affected by the treatment with zinc nano-complex. In conclusion, our data revealed that supplementation of bull semen Bioxcell extender with zinc nano-complex can decrease the level of MDA and improve mitochondrial activity, although such an improvement was not reflected in results of fertility rates.

Keywords: bull spermatozoa, DNA fragmentation, mitochondrial-activity, pregnancy, zinc nano-complex.

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Evaluating the effects of guanidinoacetic acid supplement on rooster spermatozoa freezability

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Abstract

This study was conducted to evaluate the effects of the dietary guanidinoacetic acid (GAA) on the freezability of semen by using twenty Ross commercial strain broiler breeder roosters in a complete randomized design with four treatments and five repeats for eight weeks. Roosters were fed on diets containing 0 (control), 0.06, 0.12 and 0.18 percent of GAA. Semen samples were collected weekly by abdominal massage. In order to equilibrate the temperature, semen samples were diluted with an extender and placed inside the refrigerator at 5°C. Samples were then packed into straws, exposed to nitrogen vapor and finally moved into liquid nitrogen containers. After freezing-thawing, the total and progressive motility, viability, morphology and membrane integrity of spermatozoa were assessed. The mean of total motility at the 0.12 and 0.18 percent levels were significantly higher than that of other groups ($P<0.05$). Also, the mean of progressive motility in 0.12 and 0.18 percent levels was significantly higher than 0.06 percent and control group ($P<0.05$). There were no significant differences in the viability, morphology and membrane integrity parameters between all groups. It could be concluded that supplementation rooster diets by GAA improve the sperm motility parameters after freezing-thawing.

Keywords: broiler breeder rooster diet, freezing-thawing, precursor of creatine, rooster semen, spermatozoa energy storage.

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The effect of glycogenic diets complemented with different poly unsaturated fatty acids on reproductive performance in ewe

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Abstract

The aim of this study was to evaluate the effect of glycogenic diets supplemented with different poly unsaturated fatty acids on reproductive performance of Iran Black ewes in two different managing programs. Ewes were allocated in two different groups; group A (n = 75) and group B (n = 25). Ewes from group A were stopped from suckling followed by introducing to the rams on days 80 and 90, respectively. Melatonin implant was laid under the skins ear of these ewes 40 days before introducing them to the rams. Animals from group A were divided into three groups (25 ewes/sub-group) and were fed by high starch diets supplemented with saturated fatty acids (control diet), extruded linseed (omega 3 diet), and full fat soybean (omega 6 diet). Ewes from group B were stopped from suckling on day 120, introduced to the rams on day 180 after parturition and fed as described for the control diet. Data for the rates of Estrus cycle, ovulation, lambing and twining were recorded for each group. The weight of lambs was measured at the birth time of birth, and also at 3 and 4 months of age. The lambing and twining rates were higher in omega 3 and omega 6 diets as compared with the control diet and group B. Animals in group B indicated a higher lamb weight at 3 and 4 months of age compared to all treatments in group A. In conclusion, data from current study suggested that using management program of group A along with feeding omega 3 and 6 could improve the reproductive performance of Iran Black ewes.

Keywords: cutting milk, fatty acid, melatonin, sheep, reproductive performance.

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