

STUDIES ON THE INFLUENCE OF THE COMBINED EFFECTS OF ORGANOPHOSPHORIC PESTICIDES AND GAMMA RAYS UPON THE HYDROPHILIC PROPERTIES OF LAMB

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SUMMARY

The water holding capacity (WHC) and pH- values the muscles Longissimus dorsi and quadriceps femoris of lamb from three groups of animals - healthy lambs of 2 months of age (control group - Ko); lambs of 2 months of age fed with organophosphoric pesticide "AGRIA 1050" at the dose level of 50 mg/kg live weight for 5 times at the week's interval (Kp) and lambs of the same age group as above treated simultaneously with the pesticide as in group (Kp) and gamma rays at the dose of 1.86 red before one week of slaughter (P) were studied at 6, 24, 48, and 120h of keeping at +4 °C.

The WHC was the least for both the muscles of group (Ko) till 24h while in the groups (Kp) and (P) was significantly higher.

The WHC of both the muscles of animals under group (Kp) and (P) were significantly higher ($p < 0.05$) than the animals from group (Ko) at 24h of keeping. On subsequent keeping, the WHC of both the muscles under all treatment groups decreased significantly which was, however, more apparent in case of groups (Kp) and (P). A direct and proportional relationship between the WHC and pH values of both the muscles under all the treatment groups was observed - lowering the pH values lowered the WHC.

It is concluded that the hydrophilic properties of the lamb muscles of the group (P) was better than the group (Kp) but nevertheless was lower than the group (Ko) - after 24 h of keeping.

INTRODUCTION

In recent years, many chemical substances have been introduced in the agricultural sector for obtaining higher yield and better preservation of the finished products. Entering through the food, water and other sources, these chemical substances may show different degrees of harmful effect. Organophosphoric insecticide "AGRIA 1050" is in massive use in Bulgaria. This chemical is dangerous to the domestic animals as well as the human being because of its high toxicity and nonavailability of appropriate antidote (Alldssy et al., 1981; Lein et al., 1982).

Acute irradiation diseases is caused as a result of overall effect of ionisation radiation on the organism. In case of acute irradiation disease the clinical picture depends on the level of absorbed doses (Guskova and Baisogolov, 1978).

According to Kartachov (1978) the half lethal dose in case of sheep is 3.3 Gy, however, no information is available on the effect of consuming meat from animals treated with such irradiation rays. It is of practical importance to study the combined effect of irradiation and administration of organophosphoric insecticide on the domestic animals.

The aim of the present study is to investigate the combined effect of organophosphoric insecticide "AGRIA 1050" and gamma rays upon the hydrophilic properties of lamb meat.

MATERIALS AND METHODS

The study was conducted on 20 male lambs semithinprofuse breed, crosshigh type of 60 days of age with live weight 17 - 19 kg. After a period of adaptation for 1 week, the lambs were divided into 3 groups. First group - 5 lambs were slaughtered and the meat was used as control sample (Ko). In the second group, 5 lambs were treated with "AGRIA 1050" once weekly for 5 times of the dose of 50 mg/kg live weight (as per

Simeonov(1989), this dose levels causes chronic poisoning in lambs). After the treatment period, the lambs were slughtered and the meat was used as pesticide treated control sample (Kp). In the third group, 10 lambs were first treated with organophosphoric insecticide "AGRIA 1050" as in second group. After 1 week of the last-administration of pesticide, these animals were irradiated with 2 Gy of gama-apparats "Rocus-M"(60Co) with the power of doses 0.5 rad/s. Meat from these animals was used as treated sample (P). From the lamb carcasses, the Longissimus dorsi muscle and Quadriceps femoris muscle were dissected out. The water holding capacity (WHC) and pH of both these muscles were determined. WHC of the meat was deterinedas per filter paper press method of Grau and Hamm (1953) and the pH was determined potentiometrically (Korkeala et al.,1986) with microprocessor pH/mV-meter MS 2004 (Microsist, Bulgaria). Both these parameters were studied after 6 h of slauhter and after 24h, 48h and 120h of preservation in the refrigeration at 0oC to +4oC. Microscopic photographs (400x) of the transversal section of muscle fibers from the high region of the treated lambs were also taken. The data obtained from the study were statistically analysed (Gueorguieva et al.,1987) with the size of the sample, n = 9.

RESULTS AND DISCUSSION

The WHC of m. Longissimus dorsi and m. Quadriceps femoris was the highest in case of control samples (Ko) as compared to other samples till 24h post mortem (fig.1). WHC of the samples Kp and P are significantly much lesser ($p < 0.05$) as compared to control samples (Ko) till 24h (Fig.1). Five of the 6 lested samples had statistically nonsignificant WHC ($p > 0.05$) in the period 24h - 48h. The only exception was in case of m. Longissimus dorsi of sample Kp. In case of the sample the quantity of the released free water was maximum within the period of 48h - 120h of refrigeration preservation of the meat (fig.1). In the aged meat (120h), control sample (Ko) had the best WHC and the water in sample Kp. The WHC of the treated samples (P) after 120h of preservation was inbetween the values of Ko and Kp (Fig.1). Results of the pH values of the meat (Fig.2) showed that the warm meat 96h) of the treated samples P had the lowest pH values (m. Longissimus dorsi - 6.009; m. Quadriceps femoris - 6.061). Other four samples showed higher pH values of 6.298 to 6.411 and are statistically nonsignificant ($p > 0.05$). PH of the meat obtained from the lambs of the groups Ko and Kp showed desirable tendency of reduct ion during the process of rigor mortis (24h - 48h) and a gradual increase during the period of ageing (till 120h). However, in case of the treated samples (P) the pH continued to increase and in the higher than the other four samples, m. Longissimus dorsi - 6.973 and m. Quadriceps femoris - 6.850 respectively for the sample P. The results obtained from the study showed that the WHC and the pH values are influenced by treating the animals with organophosphoric insecticide "AGRIA 1050" and gama rays. Depending on the type of muscles and the post mortem changes in the muscles these parameters change in different ways. In the warm meat (6h) treated samples P had the lowest pH values than the ather samples but the WHC (dertermined by the quantity of absorbed water by the filter paper) was high. This controversy between the lower pH values and comparatively better WHC of the meat the treated samples P may be explained partilly by the radiolysis of the water in the muscles fibres appeared during the irradiation of the lamb and the changes which occured in the bound water and the structure of the sarcoplasm as confirmed by the microscopic photographs (Fig.3). These showed that in some of the muscle fibres the sarcoplasm was with granular distrophy and in other cases the sarcoplasm was seen in nodular forms. In the muscle bundles with the advanced changes the muscle fibres were with homogenised sarcoplasm and with noncleary visible boundries between them. Also were seen rgoups of muscle fibres converted into homogenised mass of rose colour around the sarcolemma (hiatus distriphy). Inbetween the muscle bundles, the connective tissue (endothelial sells and the blood vessels) were seam to be swollen and in certain places accumulation of certain lymphohistolocytcs were noted (Fig.3). With the passing of rigor mortis and the meat nearing the process in the pH value and decrease in the WHC were seen in the treated samples.

CONCLUSIONS

From the results obtained on the study and analysis of the data the following conclusions could be drawn: Combined treatments of lambs with gama rays and organophosphoric compound ("AGRIA 1050") reduces the WHC of the meat after 48h of refigigeration preservation as compared to the meat obtained from healthy animals. However, this group of the meat had better hydrophilic properties as compared to meat treated with the organophosphoric compound only. This means that the hydrophilic properties of the lamb meat deteriorates

to a great extent with the administration of organophosphoric insecticide "AGRIA 1050", which, however can be corrected to certain extent-with irradiation of the lambs with gamma rays.

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