

Meat animal production
and
carcass quality

Present Status of Salvaging Male Buffalo Calves for Meat Production:

Field study :Dr. V. Lakshmana

Chairman

Dr. H. B. Joshi

Ph.D. Thesis, Sept.-1992

A filed study was conducted to assess the current status of care and management of buffalo calves in rural and urban sectors with special reference to male buffalo calves (MBCs), to find out the perception of rural farmers and urban dairy entrepreneurs (UCD) on “rearing MBCs for meat production”, to evaluate the meat production characteristics of market slaughter MBCs and to make preliminary studies on markets and marketing of MBCs, buffalo veal and by-products.

In all, 101 rural farmers and 87 dairy entrepreneurs were interviewed as respondents under a structured interview schedule specially designed and developed for the study. Live animal evaluation, slaughter and carcass parameters were recorded on 1712, 256 and 66 MBCs respectively. Market information was gathered by keen observation of trade practices and diligent interaction with traders. Age distribution of BCs was also higher than MBCs (47 vs. 25%). Farmers disposed 31% of their MBCs whereas the annual disposal rate of FBCs was lower at 3%. These data corroborated amply with the existing notion on rearing MBCs in rural areas- “farmers generally regarded MBCs as liabilities and FBCs as assets resulting in poor growth of MBCs and distress sale at young age” Farmers showed an overwhelming response to the idea of salvaging BCs from city dairies for meat production. Dairy entrepreneurs highly agreed with the statement – “birth of MBCs, an economic loss to the statement – “dairy neglect rearing MBCs”. Dairy entrepreneurs were highly favourable to the project.

The response of dairy entrepreneurs to participate in the project was encouraging with 80% agreeing to supply calves, Murrah and Murrah type formed 87% of the MBCs slaughtered at Delhi slaughter-house. About 10.9% calves were nondescripts. Average slaughter weight of MBCs was about 84 Kg which was much less than the weight attained when the calves were well fed. In general, yields of all the components increased with increase in live weight group from small to extra large.

In order to achieve increased meat production potential from MBCs, it is necessary to rear MBCs to attain higher slaughter weights than at present by improving nutritional status to achieve better confirmation grade.

Quality Characteristics of Pigeon Meat

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Ph.D. Thesis, *, 1986

Studies on processing procedures, slaughter characteristics, chemical composition, cooking and palatability of 30 days squab and 150 days old adult pigeon (Columbialiviadomestica) of both sexes were carried out. Live weight, dressing and evisceration percentage, cutability characteristics including meat to bone ratio of various cuts, of chilling and freezing on water uptake in meat, proximate composition of breast and thigh meat, muscle protein fractions such as sarcoplasmic, myofibrillar, stroma and non-protein nitrogen and various fractions of lipids from neutral and phospholipids, cholesterol contents, muscle fiber diameter, total heme pigments and processing of some delicious products from pigeon and their sensory acceptability are reported.

It was concluded that squab meat is superior to the meat from any other species of poultry. It has a higher protein content and a wider meat-to-bone ratio. The carcass has yellow attractive skin colour. The squab meat is more tender, juicy and nutritious.

Evaluation of carcass and meat characteristics of broiler/culled rabbits for popularization of non-conventional sources of meat.

Principal Investigator: Dr. A.H. Malik.

Co-PI: Dr. Mir Salahuddin, Dr. Sarafaraz A. Wani, Dr. M.A. Pal, Dr. T.A.S. Ganaie.

Duration: 2004-2007.

Abstract:

Rabbits both culled over 2 years of age and broilers up to 4-5 months old were procured from rabbit farms of the Faculty and Angora Rabbit Farm Wussan Pattan of Sheep Husbandry Department. The Rabbits were slaughtered by Halal Method and dressed hygienically. The Carcass characteristics were recorded and carcasses were chilled overnight before making into cut up parts and separating meat from bones. The communicated meat products, Rista and Kabab as well as non-communited meat products like Rogenjosh and rabbit meat curry were prepared. The quality of the product was evaluated for sensory, microbiological and Proximate composition. The products had good to very good acceptance and microbiological quality was within acceptable range. The Carcass and percent yield of various meat characteristics were slightly lower than reported for Broiler rabbit outside the country. However the data was comparable with those reported in the country.

Qualitative and quantitative meat characteristics of native and exotic varieties of poultry available in Kashmir valley.

Principal Investigator: Dr. Mir Salahuddin

Co-PI: Dr. Sarfaraz A. Wani, Dr. G.A. Bhat

Duration: 1999-2004

Abstract

The local chicken carcasses hardly contained any fat and thus for preparing satisfactory further processed product from such meat, the fat from alternative sources needs to be incorporated and such meat can be exploited for low fat meat product as well for direct consumption. A considerable amount of fat was available from spent hen carcasses which would help in utilizing the meat from the carcasses for development of further processed products being cheaper and easily available. The study on the quality and acceptability of nuggets prepared from the chicken meat incorporating chicken fat, hydrogenated vegetable oil (HVO), both at 10% level, and no added fat indicated that the product with satisfactory quality attributes could be prepared after incorporation of chicken fat or HVO in the formulation. The study on quality and acceptability of chicken nuggets utilizing edible byproducts (heart, liver and gizzard) at 10 and 20% level indicated that the product with satisfactory quality attributes could be prepared after incorporation of edible by-products in the formulation. The study on quality and acceptability of chicken nuggets incorporating wheat flour, textured Soya and potato (at 2.5, 10 and 10 % level respectively) as binders indicated that satisfactory product could be prepared by incorporating the binders. However, the potato extended product was liked the most by the panelists.

Value chain approach for augmenting quantity and quality of sheep meat.

production: A success story

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Problems faced by meat industry are multifarious: lack of quality meat animals, non availability of nutritional resources to rear meat animals, premature harvesting of meat animals, lack of infrastructure (abattoirs) for harvesting of meat animals, low level of value addition to meat and lack of knowhow on scientific meat production among the stakeholders. To tackle the above issues, NRCM implemented a World Bank funded National Agricultural Innovation Project, Component II (Production to Consumption) project entitled 'A Value Chain for Clean Meat Production from Sheep'. Project was implemented on consortia mode with SVVU, Tirupati as consortia partner - Mandava Foundation (NGO), Venkatachalam, Department of Animal Husbandry, Nellore and Alkabeer Exports Pvt Ltd, Medak as Associate partners. Under the project to produce crop residue based complete feed for rearing ram lambs two Rural Feed Processing Units were established in Nellore and Mahabubnagar districts of Andhra Pradesh. About 5000 weaner ram lambs were reared to higher slaughter weights by nutritional intervention (intensive and semi intensive method) besides creating awareness among the traditional sheep farmers on scientific feeding and management. Work covered 86 villages in 22 mandals spread over five districts of Andhra Pradesh. Critical analysis of on-farm study results revealed that Average Daily Gain of ram lambs reared under extensive, semi-intensive (grazing with concentrate feeding @ 1% body weight) and intensive systems (complete feeding @ 4 % of body weight) of rearing were about 80 g, 100 g and 125 g respectively. To promote clean meat production, one model slaughter house was established at College of Veterinary Science, Tirupati campus. Array of value added products were developed from meat and byproducts of sheep. 18 awareness workshops/ training programmes were organized covering various areas that include scientific sheep rearing practices, hygienic slaughtering, scientific packaging and establishment of abattoirs for the benefit of traditional sheep farmers, butchers and municipal officials from different parts of Andhra Pradesh state. More than one thousand stakeholders were benefited under the programs. Several entrepreneurs were provided technical information for establishing sheep farms and slaughterhouses. Study successfully implemented Production to Consumption based 'Value chain approach' to bring about change in the meat sector. Several such efforts are required to promote Indian meat industry.

Effect of feeding organic iron and zinc to develop iron and zinc enriched meat of Japanese quails as functional food.

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A study was carried out to develop iron and zinc enriched meat as functional food by supplementing organic Fe and Zn to Japanese quails. A total of 600 day old quail chicks were allotted to five treatment groups (T₁ to T₅) of 120 chicks each with four replicates consisting of 30 birds per replicate. Control diet (T₁) was formulated by incorporating inorganic iron (120 mg/kg) and zinc (25 mg/kg) according to NRC (1994) specifications. For each of the treatments, inorganic Fe and Zn of the control diet were replaced by organic Fe (Fe- methionine) and Zn (Zn- methionine) at recommended level (T₂), two (T₃), three (T₄) and four times (T₅) of NRC (1994) recommendations. The results at the end of 6th week showed that carcass characteristics, organ weights and sensory evaluation revealed no significant difference among dietary treatments. The Fe content was significantly ($P \leq 0.05$) higher in T₃ (240 mg/kg Fe-methionine) for breast, thigh, liver and heart and in T₄ (360 mg/kg Fe) group for gizzard and minced meat when compared to control group having inorganic Fe (120 mg/kg). The Zn content was significantly higher in T₅ for breast and in T₄ for thigh similarly for liver and heart. In minced meat the Fe and Zn contents were significantly higher in birds fed with diet consisting 240 mg of Fe/kg diet and 75 mg of Zn/kg diet organic Zn in comparison to all other dietary groups. The study revealed that increasing levels of iron and zinc up to 240 and 75 mg/kg, respectively, in organic form have beneficial effect on iron and zinc enrichment of meat in Japanese quails without affecting the carcass characteristics and sensory attributes.

Effect of supplementation on growth, nutrient availability, carcass traits and meat quality in *Barbari* kids reared under semi-intensive and intensive systems.

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Eighteen post-weaned male *Barbari* kids (10.68 ± 1.63 kg BW) were divided into three equal groups to study the effect of supplementation of concentrate mixture under semi-intensive and intensive system of management. The kids under T₁ and T₂ were allowed 5-6 hours of grazing daily. The kids under T₁ (control) were supplemented with barley grain only @2% of body weight mixed with common salt and kids under T₂ were supplemented with above concentrate mixture (CP-18.87%, TDN-70.33%) @ 2% of body weight. The kids (under T₃), reared under intensive system, were fed with same concentrate mixture @ 2% of body weight with gram straw (*Cicer arietinum*) and green fodder *ad libitum*. Five kids from each group were slaughtered at 10 months of age. Average daily gain (ADG) was statistically similar among three treatment diets; although there was improvement of daily weight gain by 16.25 and 11.59 percentages in concentrate mixture supplemented T₂ and T₃ diets. TDN intake was significantly higher ($P < 0.05$) in T₂ and T₃ than T₁. The TDN intake (g)/kg $W^{0.75}$ ranged from 35.17 (T₁) to 48.94 (T₃). However, highest ($P < 0.05$) DCP intake/kg $W^{0.75}$ was recorded in kids supplemented with concentrate mixture under semi-intensive system (T₂). Though there was no significant difference among the diets, supplementary feeding improved the slaughter weight by 1-1.5 kg. Hot carcass weight was marginally higher in T₂ (10.34 kg) and T₃ (10.48 kg) than T₁ (9.24 kg). Similarly improved dressing percentage was obtained in T₂ (49.12%) than T₁ (46.10%). The kids supplemented with concentrate mixture showed significantly ($P < 0.05$) higher forequarter percentage (27.93% in T₂, 27.18% in T₃) than the control (25.61%). Kids under T₂ had significantly ($P < 0.05$) higher separated lean (71.65%) than T₃ (66.38%) but T₃ deposited more fat in the muscles. However, no differences were observed in the chemical composition of *Longissimus dorsi* muscle among various dietary treatment groups. It may be concluded that supplementation of concentrate mixture (@ 2% of body weight) may be used for improving nutrient utilization, growth potential and meat productivity in finisher kids under semi-intensive and intensive systems of man.

Transgenic animals: A paradigm for scaling-up 'meat quality'

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Augmentation in agronomic traits in all livestock species has been acquired during the past numerous decades via reproductive technologies like transgenesis. A transgenic animal is one into which a new gene has been introduced or in which an existing gene has been modified by human intervention. Transgenesis involves genetic modifications that are aimed at improving the efficiency of food (meat or milk) production. Many experiments have been made in which gene transfer technologies have aided efforts to improve growth rate of major farm animals - pigs, sheep, cows, goat - in a hope to increase meat production and to lower its costs. Animal production traits can be modified by the addition of transgenes to act on the food product itself or to modify existing pathways in the animal to enhance the safety and/or value and healthfulness of the animal food product. Transgenic technology application aims at the improvement of meat production by introducing several hormones like insulin-like growth factor 1, human and porcine growth hormone releasing factor, bovine, human and porcine growth hormone in pigs, human growth hormone releasing factor and ovine growth hormone in sheep. Mammals depend on dietary source for essential fatty acids as they lack the enzyme for their synthesis but transgenic pigs have been proved to be the direct source of beneficial n-3 PUFA and can produce meat with improved nutritional quality. The transgenic approach can also be used to enhance food safety and quality pre-harvest as well. Nutraceuticals—compounds that provide a medical assistance to humans—also could be created in the meat of livestock via transgenesis.

Designer food: Omega -3- enriched chicken meat.

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A broiler biological experiment was conducted to study the effect of various n-3 lipid sources (at one, two and three per cent levels) in broiler ration at Veterinary College and Research Institute, Namakkal, Tamil Nadu. Fish, linseed and rapeseed oils used as n-3 lipid sources to enrich n-3 fatty acids in chicken meat. The supplementation of n-3 lipid sources in broiler ration had significant ($P < 0.01$) increase on n-3 fatty acids composition such as linolenic acid, EPA, DHA, total n-3 fatty acids, total n-6 fatty acids and total n-3 / n-6 fatty acids ratio of broiler meat and a significant reduction ($p < 0.01$) in palmitic and stearic acids concentration. The total unsaturated fatty acids concentration in breast and thigh meat of broilers showed an increase in all the treated groups due to incorporation of various n-3 lipid sources in feed. The inclusion of n-3 lipid sources in broiler ration had no adverse effect on organoleptic assessment such as appearance, juiciness, flavour, tenderness and overall acceptability scores.

1.06 Evaluation of four crossbreds chicken for different carcass quality traits and effect of age on carcass quality.
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Backyard poultry farming in rural areas are being practised due to its many advantages. Improved birds are being developed by breeders for better returns from backyard farming. Carcass quality of the male bird is an important characteristic of backyard poultry. Present study was undertaken to evaluate male birds of four different crossbreds chicken (PD1 X PD4, PD1 X PB2, PD1 X PD3, PD1 X IWI) for different carcass quality parameters at 10 and 18 weeks of age. At 10 and 18 weeks of age 8 and 6 birds each from each genetic group, respectively, were sacrificed to measure different carcass quality traits. Effects of age on each genetic group in respect to different carcass quality traits were also studied. At 10 weeks of age statistical significance between different genetic groups were observed for body weight, feather, head, shank, eviscerated yield, liver, gizzard, abdominal fat and giblet %. Significantly higher eviscerated yield % was obtained in PD1 X PD4 and PD1 X PB2 compared to other crossbreds. Abdominal fat % was lowest in PD1 X IWI. At 18 weeks of age body weight differ significantly between genetic groups. Head, shank, eviscerated and liver % differ significantly between different genetic groups. Highest eviscerated % was obtained in PD1 X PB2 with lowest abdominal fat. In PD1 X PD4 there was significant reduction of shank, gizzard and giblet % at 18 weeks of age compared to 10 weeks. Age effect was significant for eviscerated yield, liver, gizzard, abdominal fat, and spleen for PD1 X PB2. In PD1 X PD3 head, shank, liver, gizzard and giblet % reduced significantly at 18 weeks of age. Similar trend was observed for PD1 X IWI. Numerically there was improvement in eviscerated yield % at 18 weeks of age in all the genetic groups. Cut up parts percentage expressed as % of eviscerated weight showed significant difference between genetic groups for leg % at 10 weeks of age. Other traits did not differ significantly between genetic groups irrespective of age. Age showed significant effect for back and leg % in PD1 X PD4 and PD1 X PB2, whereas PD1 X PD3 and PD1 X IWI showed significant effect of age for neck and leg % and back and neck %, respectively. The results indicated that genetic groups and age significantly affect different carcass qualities and PD1 X PB2 male recorded better eviscerated yield compared to other genetic groups. Leg cut % increases with increase of age.

Study of the primal cut-up-yields of White Giant, local and crossbred rabbits.

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A study on the primal cut-up-yields of three breeds of rabbits maintained in cage system of rearing was undertaken at 12 weeks of age. Ten animals of each group irrespective of sex were slaughtered after perfect stunning and decapitation. The primal cut-up-yields of the rabbits were expressed in percentage of chilled carcass weight. Study of the primal cuts of different breeds revealed highest proportion of hind-legs followed by loin and breast and ribs almost in all the breeds. The cuts of fore-legs and flank came next in the decreasing order of edible splits. The average hind-leg percent were 26.90, 29.00 and 28.27 for White Giant, local and crossbreds. The loin percent in White Giant, local and crossbreds were 24.90, 23.15 and 24.80. The breast and ribs were 19.75, 17.08 and 18.29 percent in White Giant, local and crossbreds. The fore-leg percent were 16.55, 17.40 and 16.57 in White Giant, local and crossbreds respectively. The flank percent in White Giant, local and crossbreds were 7.25, 6.17 and 6.12.

Effect of pre-probiotics on growth rate, digestive enzymes activity, total protein and antibody titre of *Labeo rohita*.

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Aquaculture is an industry that encompasses the cultivation of aquatic organisms and plants in controlled systems for commercial, ornamental or resource management purposes and provides food and medicine for human population. The use of probiotics in the culture of aquatic organisms is increasing with the demand for more environment friendly aquaculture practices. Apart from the probiotics, microbial derived compounds (pre-biotics) such as β -glucans, lipopolysaccharide and peptidoglycan, are used as immuno-stimulants and for cellular function as well. There is paucity of reports in the effect of synbiotics (pre and probiotics) supplemented diet in the teleost (*Labeo rohita*) health and productivity. Hence, we concentrated to evaluate the effect of synbiotic supplemented feed on growth rate, digestive enzymes activity, total protein and total antibody titre of *Labeo rohita*. The growth rate in the experimental group fed with synbiotic supplemented diet was significantly (0.92 ± 0.12) higher than the control group fed with commercial fish feed (0.27 ± 0.03). The significant change was observed in the digestive enzymes of lipase (0.0016 ± 0.00), amylase (0.40 ± 0.02) and cellulose (0.76 ± 0.03) activity in the experimental group than the control group fishes (lipase (0.001), amylase (0.19 ± 0.02) and cellulose (0.39 ± 0.03)). The total protein level of experimental group fishes (0.39 ± 0.03) significantly higher than the total protein in the control group fishes (0.29 ± 0.01) and the total serum antibody level have been raised after 35 days of treatment by the synbiotic supplement. Thus the observed health parameters indicated the better performance of synbiotics displayed by improved productivity of *Labeo rohita*.

Carcass traits and meat quality of *Malpura* lambs supplemented with microbial feed additive.

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The trial was carried out on sixteen randomly selected Malpura lambs; which were divided into four groups, penned and fed individually, and were drenched with different doses of probiotic (*S. cerevisiae* culture 3.6×10^9 cells/ml) at 0.0 (control); 0.5 (T1); 1.0 (T2) and 1.5 ml (T3) per kg body weight. The lambs were fed *ad libitum* concentrate mixture along with Pala (*Zizyphus nummularia*) leaves as roughage source. At six months of age, the lambs were slaughtered to evaluate carcass attributes. Average pre-slaughter weight was 21.9 ± 2.53 , 19.7 ± 1.04 , 25.2 ± 1.46 and 24.2 ± 3.54 kg for control, T1, T2 and T3 respectively.

There was no significant effect of probiotic supplementation on pre-slaughter weights of lambs. The dressing percentage on ELW was comparable among the groups. The Loin eye area, yields of edible and inedible offals were comparable between the treatments. No significant effect was observed on the proportion of different commercial cuts due to probiotic supplementation. Yield of lean meat and fat content was comparable among the groups. Similarly, dissected bone percentage, meat: bone ratio and lean: fat ratio was comparable amongst different treatment groups. No significant difference was observed in the cooking losses, water holding capacity and shear force values between the groups. The present study suggested that supplementation of *Saccharomyces cerevisiae* culture to Malpura lambs did not have any beneficial effect on carcass traits and meat quality.

Effect of freeze thaw cycle on myofibrillar proteins and histology of chevon.

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The muscles comprising of *Semitendinosus*, *Semimembranosus* and *Biceps femoris* from chevon carcass were collected aseptically, packaged in LDPE bags and transferred to deep freezer ($-18\pm 2^{\circ}\text{C}$). The frozen chevon samples were thawed at every 5 days by three different thawing methods viz., Refrigeration temperature ($4\pm 1^{\circ}\text{C}$), Hot water ($40\pm 1^{\circ}\text{C}$) and Room temperature ($35\pm 2^{\circ}\text{C}$). At every freeze thaw cycle, samples were analyzed for histological alterations and isolation of myofibrillar proteins by SDS-PAGE. Myofibrillar protein extraction and gel electrophoresis study revealed that freeze thaw cycle abuse affected myofibrillar proteins. The study confirmed increased deteriorative changes in major

myofibrillar proteins viz. myosin, actin, tropomyosin, troponin, α -actinin etc. The degradation products (low molecular weight polypeptide bands) were observed to increase with the increase in freeze thaw cycles. Also, the protein bearing molecular weight 66 kDa representing tropomyosin was found degraded in all freeze thaw cycle. In addition, hot water and room temperature thawing revealed low intensity band in 3rd freeze thaw cycle. Appreciable changes were found in histological architecture in first freeze thaw cycle as evident from increased interfascicular spaces and distortion in muscle fiber irrespective of methods of thawing. After the second and third freeze thaw cycle, the muscle fiber was torn and showed disordered arrangement and spacing between muscle fiber increased with graded distortion.

Effect of dietary supplementation of Fe-methionine chelate and Zn-methionine chelate on the mineral content of Japanese quail meat.

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Micronutrient specially minerals play a vital role in livestock and human health. The present study was conducted to evaluate the effects of supplementing different levels of Fe (Fe-methionine chelate) and Zn (Zn-methionine chelate) on mineral content of the Japanese quail meat. A total of 600 day-old quail chicks were allotted to five treatment groups (T₁ to T₅) of 120 chicks each with four replicates consisting of 30 birds per replicate. Birds were housed in battery cages under standard managerial conditions and fed *ad libitum* for a period of six weeks. Control diet (T₁) was formulated by incorporating inorganic iron (120 mg/kg) and zinc (25 mg/kg) as per NRC (1994) specifications. The inorganic Fe (FeSO₄) and Zn (ZnSO₄) of the control diet were replaced by Fe-methionine chelate and Zn-methionine chelate at recommended level (T₂), two (T₃), three (T₄) and four times (T₅) of NRC (1994) specifications. The mineral analyses of minced meat showed that calcium, magnesium and 265 iron ($\mu\text{g/g}$) content were significantly ($P \leq 0.05$) higher in the meat of T₃ (240 and 50 mg/kg Fe and Zn, respectively), copper, manganese and zinc ($\mu\text{g/g}$) in T₄ (360 and 75 mg/kg Fe and Zn, respectively) and cobalt ($\mu\text{g/g}$) in T₄ and T₅ (480 and 100 mg/kg Fe and Zn, respectively) groups consisting higher level of Fe (Fe-methionine) and Zn (Zn-methionine) in comparison to other dietary groups. The study revealed that supplementation of increasing levels of iron and zinc up to 360 and 75 mg/kg, respectively, from organic (Fe-methionine chelate and Zn-methionine chelate) sources have beneficial effect on the mineral content (Ca, Mg, Co, Cu and Mn) of Japanese quail meat and thus could be used to improve the micronutrient status in human health.

Carcass Characteristics of *Krishibro* birds.

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Krishibro is a broiler variety developed for backyard rearing; it attains a body weight of 1.3-1.5 kg at the end of 6 weeks of age. A study was undertaken to assess the carcass characteristics of Krishibro birds reared in the Department of Poultry Science. A total of 20 birds were slaughtered in model slaughter house of Department of Livestock Products Technology. The mean slaughter weight (1.254kg), Heart carcass weight (1.156kg) and dressing per cent (67%) were significantly ($P<0.05$) lower than commercial broiler. The mean bleeding percentage (3.8%) was significantly ($P<0.05$) lower when compared to the control group. The mean total per cent yield of edible offal (Based on slaughter weight) was 7.2%. The mean per cent yield of saleable meat with bone was 54.78%. The per cent losses were 37.90 %. From the above study it can be concluded that Krishibro can best be utilised for meat production at farmers backyard.

A study on effect of pre slaughter weight on carcass composition of kanni goat.

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A study on the Effect of pre slaughter weight on carcass composition of intact Kanni male goat were carried out at Department of Meat Science and Technology, Veterinary College and Research Institute, Namakkal. A total 12 goats were divided into two weight groups. Group I consisting of six goats with the pre slaughter live weight ranging from 12 to 15 kg and Group II having a weight above 15 kg and up to 18 kg. All the experimental animals were slaughtered by Halal method. A day before slaughter, the animal were starved for 12 to 16 hours with free access to water only. The head was removed at the atlanto- occipital junction and flaying was done by case on method. The bleeding, dressing and evisceration were done by using the standard procedure. The mean percent of separable lean meat weight of Group I was 27.83 ± 0.92 and the Group II was 30.65 ± 1.01 and found that it did not differ significantly. However the mean separable bone weight of Group I (2662.73 ± 0.42) and Group II (13.89 ± 0.29) differ significantly ($p < 0.05$). The present study shows that pre slaughter weight had more effect on separable bone weight than separable lean meat.

**A study on effect of pre slaughter weight on physico-chemical
properties of *Kanni*
goat meat.**
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A study on effect of pre slaughter weight on physico-chemical properties of intact *Kanni* male goat meat were carried out at Department of Meat Science and Technology, Veterinary College and Research Institute, Namakkal. A total 12 goats were divided into two weight groups. Group I consisting of six goats with the live weight ranging from 12 to 15 kg and Group II having a weight above 15 kg and up to 18 kg. The animals were slaughtered by Halal method. The bleeding, dressing and evisceration were done by using the standard procedure. *Longissimus dorsi* muscle were separated from carcass and used to study the physico-chemical properties. The pH, water holding capacity (cm^2), muscle fiber diameter (μm), sarcomere length (μm) of Group I (6.64 ± 0.09 , 1.59 ± 0.12 , 35.91 ± 1.84 and 1.61 ± 0.09) and Group II (6.48 ± 0.11 , 1.65 ± 0.02 , 36.81 ± 2.48 and 1.56 ± 0.06) was recorded in this study and it was statistically not significant. However, the shear force (kg/cm^2) value of Group II (4.14 ± 0.05) was significantly ($P < 0.05$) higher than Group I (3.75 ± 0.06) indicating comparative toughness of meat as the live weight of the animal is increased.

**A study on effect of pre slaughter weight on proximate composition of
Kanni goat
meat**

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A study on effect of pre slaughter weight on proximate compositions of intact Kanni male goat meat were carried out at Department of Meat Science and Technology, Veterinary College and Research Institute, Namakkal. A total 12 goats were divided into two weight groups. Group I consisting of six goats with the live weight ranging from 12 to 15 kg and Group II having a weight above 15 kg and up to 18 kg. The animals were slaughtered by Halal method. The bleeding, dressing and evisceration were done by using the standard procedure. *Longissimus dorsi* muscle were separated from carcass and used to study the proximate composition of kanni goat meat. The proximate analysis viz., mean moisture content(%), crude protein(%), crude fat (%) and total ash (%) of Group I (76.39 ± 0.15 , 19.56 ± 0.09 , 2.30 ± 0.06 and 1.20 ± 0.01) and Group II (75.86 ± 0.20 , 19.68 ± 0.17 , 2.39 ± 0.11 and 1.27 ± 0.04) was recorded in this study and found no significant differences between the two Groups. This present study revealed that pre slaughter weight had no effect on the proximate composition of the meat.267

Poultry meat production: an overview.

**S. EZHIL VALAVAN, D. THYAGARAJAN, T. SENTHIL KUMAR,
N. VENGADABADY, A. BHARATHIDHASAN, N. K. SUDEEP
KUMAR AND A. SHYAM BABU.**

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The world's production of poultry meat is approaching 100 million metric tons for the first time in history. According to the FAO, the world meat production will grow at an average rate of 1.8 per cent per year until 2020 and the world's chicken meat production will be 122.5 million metric tons by the year 2020. On the world stage chicken production represents about 87 per cent compared with 6 per cent for turkey meat, 4 per cent for duck meat and less than 3 per cent for the combined category of geese with guinea fowl. The world average consumption of poultry meat was 12.5 kg per person in 2011. This compares with 13.5 kg for pork, 8 kg for beef and veal combined and 1.6 kg for sheep meat. The duck meat production keeps on increasing. Asia is the main region for producing duck meat, having a market share of 84 per cent. The number of ducks produced for meat globally was 800 million in 1990, rising to 2 billion in 2000 and nearly 2.7 billion in 2010, compared with current totals of 660 million for turkeys and 625 million for geese and guinea fowl. India is the fifth largest producer of poultry meat in the world. Poultry meat production has increased from 0.069 million tonnes in 1961 to 2.33 million tonnes in 2010-11. The per capita availability of poultry meat is 2.15 kg as against the recommendation of the National Institute of Nutrition at 11 kg of meat per annum.

Carcass characteristics and meat quality of sheep fed with different levels of Zinc in the diet.

P. BASWA REDDY, D. B. V. RAMANA¹, B. M. NAVEENA AND A. R. SEN

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To study the effect of feeding different levels of Zinc in the diets of sheep on growth, carcass characteristics and meat quality, twenty four weaned Deccani sheep weighing around 13-14 kg have been divided into four groups of six each. The animals were fed within the stalls with *adlib* chopped maize straw along with concentrate mixture @ 1% of body weight. The Zinc content of the concentrate mixture varied for different groups. Group 1 was used as negative control without mineral mixture and Group 2 was used as positive control with addition of mineral mixture at 2% level in the concentrate mixture. In group 3 and 4 additional zinc content was added in the form of ZnSo₄.7H₂ @ 70g and 140g per 100kg respectively. Overall, the Zn contents in the total feed consumed by the animals in Group 1, 2, 3 and 4 were 17.7, 69.2, 122.7 and 174.7 ppm respectively. At the end of 120 days growth trial, representative animals from each group were slaughtered and the carcass characteristics and meat quality parameters were evaluated. Though the results have indicated slight increase in ADG & meat:bone ratio and decrease in drip loss & thaw loss with increase in Zn concentration in the diets, the changes were not significant. Shear force value 268 decreased ($p < 0.05$) as the Zn level in the diet increased indicating that tenderness of meat is influenced by Zn consumption by the animal. Sarcoplasmic protein ($p = 0.073$) and Total soluble protein ($p = 0.055$) in the meat decreased slightly over a period of 3 days under refrigerated storage in polythene bags. The results indicate that Zn content in the diets of sheep has influence on the meat quality parameters and these findings need to be validated with bigger sample size.

Effect of different levels of Selenium in sheep diets on carcass characteristics and meat quality.

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A growth cum slaughter study was conducted in ram lambs to evaluate the effect of different levels of inorganic selenium in the diets on the growth, immunity, carcass characteristics and meat quality. Twenty four weaned native ram lambs of 14-15 kg initial weight have been divided into four groups of six each. They were offered *adlib* roughage in the form of chopped green fodder and maize straw along with concentrate feed @ 1% of body weight for 120 days. Selenium content of the concentrate mixture differed for different groups. Sodium selenite (Na_2SeO_3) was added @ 0, 0.1, 0.2 and 0.4 g/100kg in the concentrate mixture for group 1, 2, 3 and 4 respectively. The body weights of animals were recorded at fortnightly intervals. At the end of the growth study, the animals were slaughtered to study the carcass characteristics and meat quality parameters. There was slight improvement in the ADG in selenium supplemented animals though the gains were statistically not significant. Dressing percentage was not influenced by the selenium supplementation. The fat percentage of the carcass was slightly higher ($p > 0.05$) in the control group compared to the selenium supplemented groups (9.21, 7.86, 8.97 and 8.40% in group 1, 2, 3 and 4 respectively) The immunity levels in terms of humoral response as well as skin fold thickness were significantly affected by the supplementation of selenium in the diet. The results indicate that immunity and carcass composition are influenced by supplementation of Selenium in the diets of ram lambs and these findings need to be further evaluated in larger flocks.

Increasing the meat productivity of ram lambs through intensive feeding with crop residues based complete feeds.

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Slaughtering of meat animals before attaining slaughter weight is one of the main reasons for decreased productivity of these animals. A field trial was conducted with Nellore Jodpi ram lambs in the farmers fields in their native tract to study the impact of stall feeding with crop residues based complete feeds on their growth performance and meat yield. A total 269 of 436 ram lambs belonging to 11 farmers in 7 villages in Nellore district of Andhra Pradesh were included in the study. Animals were divided randomly into two groups. Animals in control group were reared under the traditional system of extensive grazing and the animals under intensive rearing were stall fed with complete feeds. Locally available crop residues like maize straw and groundnut haulms were used as roughage components in the complete feeds. Animals were offered complete feeds @ 3.5-4% of body weight for 120 days. Body weights of animals in both the groups were monitored at fortnightly intervals. Representative animals from each group were slaughtered at the end of the growth trial. Average Daily Gain (ADG) in stall fed animals was significantly ($p < 0.05$) higher (117g) than the ones under extensive grazing (80g). The dressing percentage increased slightly under intensive feeding (48% vs 50%). Meat yield per animal was higher by 2.9 kg under intensively reared animals when compared to those reared under extensive grazing system. The results indicate that the productivity of ram lambs can be increased significantly under stall feeding with completed feeds and this has the potential to increase the mutton production in the region by 25% with the existing germ plasm and without increasing the number of animals.

Effect of pre-slaughter weight on carcass characteristics and sensory qualities of *Kanni* goat meat
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Twelve numbers of intact *Kanni* male goats were purchased from the native tract Sattur, Virudhunagar District of South Tamilnadu and they were brought to the Department of Meat Science and Technology. The experimented animals were divided into two weight groups basis on their pre-slaughter weight. The Group-I consisting of six goats with the pre slaughter weight ranging from 12 to 15 kg and Group-II having a pre slaughter weight above 15 kg and up to 18 kg. The mean carcass length, gigot width, carcass compactness of Group- II was significantly ($P<0.05$) higher than Group-I. But there was no significant difference in the gigot conformation of Group-I and Group-II. The per cent yield of edible offal's viz. Blood, lungs and trachea, heart, spleen, kidney, pluck, caul fat, kidney fat and mesenteric fat of Group-I and Group-II did not show any significant difference. There was no significant difference ($p>0.05$) in primal cuts viz., neck & shoulder, Breast & fore shank, Rack, Loin, Leg of Group-I & Group-II. No significant difference was found between the two groups with regard to the organoleptic evaluation scores viz. color, appearance, flavor, juiciness and overall acceptability. However, the tenderness scores showed significant ($P<0.05$) differences between the two weight groups. This present study revealed that the carcass length, carcass compactness, gigot width of *Kanni* goat proportionately increased with the pre slaughter weight increased from 12 to 18 kg. Hence slaughtering *Kanni* goats between 15 to 18 kg live body weight will be more economical than lesser body weight groups. 270

Proximate composition of meat of Coimbatore lambs

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Coimbatore sheep are raised mostly as migratory flocks (95.5 %) and are distributed in Erode, Coimbatore and Dindigul districts of Tamil Nadu and Palakad and Thrissur districts of Kerala. Though the sheep is classified under wool-type, due to low price for wool and drudgery of shearing of wool, the animals are reared mainly for meat and raised solely on grazing. Coimbatore lambs of six and nine months (n=19) age were procured from the breeding tract and slaughtered by Halal method as per standard procedures in VCRI, Namakkal and the proximate composition of the meat samples collected from loin-eye muscle (*Longissimus dorsi*) was analysed as per the AOAC (1995) at the Animal Feed Analytical and Quality Control Laboratory, VCRI, Namakkal. The mean pre-slaughter live weight was 12.55 ± 0.56 and 16.75 ± 0.58 kg respectively for six and nine month lambs. The mean dressing per cent in six-month and nine-month lambs were 44.38 ± 0.73 and 43.59 ± 0.62 respectively. The traits did not differ significantly ($P > 0.05$) between ages and sexes. The proximate composition analyses revealed that mean moisture, crude protein, ether extract and total ash contents of meat of six months lambs were 78.36 ± 0.25 , 19.37 ± 0.24 , 0.52 ± 0.05 and 0.98 ± 0.02 per cent respectively. The respective values at nine months were 77.86 ± 0.50 , 19.39 ± 0.34 , 0.66 ± 0.13 and 0.97 ± 0.04 per cent respectively. Further it was found that the differences between the ages (six and nine months) and sexes for the proximate composition of meat were not found significant ($P > 0.05$). The meat of Coimbatore sheep was leaner than that in other sheep, as indicated by low ether extract.

Slaughter studies in *Mecheri* sheep.

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Slaughter and dressing yield of the Mecheri sheep (27 males and 13 females) maintained at the model livestock farm of the Veterinary college and Research Institute, Namakkal was recorded. The sheep were slaughtered by humane method i.e. by performing electrical stunning prior to bleeding in the model slaughter house of the Department of Meat Science and Technology. Irrespective of age, the mean slaughter weight, hot carcass weight and dressing percentage were higher in males (20.21kg, 9.18kg and 45.12%, respectively) than females (14.17kg, 6.21kg and 42.43% respectively). Dressing percentage in males was significantly ($p < 0.05$) higher than females. The mean bleeding percentages in males and females were 3.72% and 3.65%, respectively. The mean total percent yield of edible offal (liver, heart, spleen, trachea and lungs, kidneys, testicles and empty stomach and intestines) based on slaughter weight were higher in males (26.01) than females (20.26). The mean total percent yield of inedible offal (blood, head, skin and feet) based on slaughter weight 271 were higher in females (25.18) than males (24.65). The mean percent yield of saleable meat with bones was higher in males (94.18) than females (90.52). The percent post-harvest losses (evaporating, cutting and trimming) were higher in females (9.43) than in males (6.88).

Slaughter studies in large *White Yorkshire* pigs.

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Slaughter and dressing yield of the Large white Yorkshire pigs (27 males and 19 females) maintained at the model livestock farm of the Veterinary college and Research Institute, Namakkal was recorded. The pigs were slaughtered by humane method i.e. by performing electrical stunning/mechanical-penetrative type of stunning prior to bleeding in the model slaughter house of the Department of Meat Science and Technology. Irrespective of age, the mean slaughter weight, hot carcass weight and dressing percentage were higher in females (80.25kg, 57.30kg and 71.32%, respectively) than males (69.43kg, 47.50kg and 67.53% respectively). Dressing percentage in females was significantly ($p < 0.01$) higher than males. The mean bleeding percentages in males and females were 1.44% and 1.01%, respectively. The mean percent yield of saleable meat with bones was higher in males (77.58) than females (75.28). The percent post-harvest losses (evaporating, cutting and trimming) were higher in females (3.01) than in males (2.82).

A study on carcass characteristics and cut-up- parts of commercial broiler (*babcock*) birds.

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A total of one hundred Broiler (Babcock) birds, Fifty birds of six week and another fifty birds of seven week old were procured from the Department of Poultry Science, NTR College of Veterinary Science, Gannavaram and slaughtered at the Department of Livestock Products Technology to study the various carcass characteristics and cut-up-parts yield of broilers at six and seven week old. The mean weights of broilers of six and seven week old at the time of slaughter were 1.74 ± 0.45 and 2.56 ± 0.23 respectively. The mean per cent blood loss, feather along with skin and evisceration losses of six and seven week old broilers were 5.21 ± 0.23 , 25.28 ± 0.33 , 36.78 ± 0.22 and 2.84 ± 0.34 , 22.73 ± 0.12 , 34.52 ± 0.23 respectively. The per cent blood loss, feather along with skin and evisceration losses were significantly ($P \leq 0.01$) higher in six week old birds than broiler birds of seven weeks. The per cent carcass yields of six and seven week old broilers were 67.24 ± 0.45 and 72.19 ± 0.11 respectively. The per cent carcass yields were significantly ($P \leq 0.01$) higher in seven week old birds when compared to six week old birds. There was no significant difference in the yield of giblets and various cut-up-parts of both the age groups. The dressing and drawing losses were more 272 in broilers of six week old than of seven week old broilers. Therefore the by-products losses were more in birds slaughtered at six weeks than seven week old birds.

A Study on Socio-economic upliftment of meat industry workers in Krishna district of Andhra Pradesh.

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A Study has been conducted on Socio-economic upliftment of Meat Industry workers in Krishna District of Andhra Pradesh. In this survey we have contacted hundred and twenty meat industry workers and recorded various aspects of their present socio-economic status in

the society. Under this socio-economic upliftment we have studied Socio-economic profile, needs identification, Social vices, Adaption of innovations, Mass media exposure, Intervention diagnosis for butchers, Intervention diagnosis for non-butchers, Job satisfaction, Expectations for betterment in work environment, family welfare and financial status. Regarding Socio-economic profile almost all Meat Industry workers noticed were under Below Poverty Line (BPL). No female meat industry worker was noticed in this survey. About 40% of Muslims, 37% of Hindus and 19% of Christian were involved in this industry. Hindus were mostly non-butchers. No meat Industry worker has given any type of formal training by government or non-governmental organizations. 50% of meat workers having an experience of more than ten years. Regarding needs identification almost all meat industry workers were not aware of animal welfare and ethics. But all of them were aware about humane slaughter, mechanized slaughter, and value added meat products. Regarding social vices about 30% of workers were having the habit of liquor consumption, another 30% of workers having the habit of smoking, 10% of workers having the habit of chewing tobacco or pan. Regarding adaption of innovations, they preferred to adopt improved technologies only after they have seen it and appreciated its value. When comes to mass media exposure almost all workers were exposed to News paper, Radio, Television and Telephone but not computer. About 50% of workers expressed job satisfaction but almost all them reluctant to enter their children into this profession. With this we concluded that meat industry workers need regular formal training about awareness of various zoonotic diseases along with improved technologies for their socio-economic upliftment and hygienic meat production.

Nutritional mapping of pork carcass.

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There are five wholesale cuts of a pork carcass namely Boston butt, Picnic shoulder, Loin, Bacon and Ham. The present study categorized these cuts on the basis of their yield of meat by evaluating meat: bone: fat ratio. The cuts were also placed for nutritional mapping by proximate analyses and assessment of vitamins and minerals. The cuts were also studied for 273 some heavy metals and pesticides. Results show that yield wise the cuts can be categorized for commercial purpose whereas from the nutritional point of view there is differences between parts of cuts but such differences were non-significant. Heavy metal and pesticide residue levels were within the permissible limits as notified by FSSAI, (2006).

**Influence of age and sex on the carcass characteristics of three way
synthetic breed pig raised under swill fed regime.**

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The objective of this study was to evaluate effect of age, sex on the carcass characteristics, cut up parts and meat cum bone ratio of three way synthetic pig breed (25% large white Yorkshire x 25% Landrace x 50% Duroc). A total of 65 pigs, which was born at various season with different age group were selected for the quantitative carcass characteristics studies. All these animals were maintained under swill fed condition, selected randomly, slaughtered hygienically and dissected manually. The parameters studied included live weight, hot carcass weight, dressed weight, edible offal, inedible offal, carcass length back fat thickness weight and cut up parts (offal, inedible offal, carcass length, back fat thickness weight and cut up parts (boston butt, picnic shoulder, ham, loin, belly) and meat cum bone ratio. In general, female had a better carcass characteristics and were leaner than males and differed ($p < 0.05$) significantly. From this study, it was concluded that the carcass characteristics, cut up parts and meat cum bone ratio of three way synthetic breed were directly affected by age, sex and season.

Association between meat quality and calpastatin (CAST) gene polymorphism in Nellore and Deccani sheep breed.

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Studies were conducted to explore the genotypic pattern for CAST gene and meat quality traits in local sheep breed of Nellore and Deccani. In genotyping studies two haplotypes such as AA and AB were observed. In Nellore breed, the frequency of AA genotype was 0.64 while that of AB genotype was 0.36. Consequently, the frequencies of alleles A and B were 0.82 and 0.18 respectively in Nellore sheep. The phenotypic pattern were studied by analyzing traits such as pH, Water holding capacity, drip loss %, thaw loss %, cook loss%, instrumental colour values (L*, a*, b*, hue and chroma) and shear force values. Genotype had a significant ($P < 0.05$) influence on pH₄₅ and the breeds significantly influenced the ultimate pH of meat. No significant difference was observed in drip loss and thaw loss% of *longissimus dorsi* from two sheep breeds with different genotypes. Both the breed and the genotype significantly ($P < 0.05$) influenced the instrumental redness values of mutton. The AA genotype of Nellore breed had higher redness values (14.29) as compared to 274 AB genotype (11.41). Breed significantly ($P < 0.05$) influenced the hue and chroma values of mutton. Shear force value was higher in mutton of Nellore breed as compared to that of Deccani breed. The nucleotide sequence of two alleles (AA and AB) was aligned using DNA* software to explore mutation in the CAST gene in our sheep population. Four SNPs have been observed at 183, 185, 186 and 187 position of the gene in which allele A was differed from allele B inferring nucleotide changes by G/A, C/G, A/T and A/C respectively. Out of four SNP's, the SNP at 183rd position reveal the transitional form of mutation while 185th, 186th and 187th position unrevealed the transversion form of mutation. The allele sequences have been submitted to NCBI gene bank (id: 1533494). It can be concluded from the present study that the allele and genotype frequency for CAST gene is entirely different in two indigenous sheep breeds. Genotype had significant influence on meat quality particularly pH, instrumental redness, cook loss%. Allelic sequences are having difference in our indigenous sheep population as compared to exotic breed.

**Influence of age on fatty acid profiles and cholesterol levels in emu
(*Dromaius novaeholland*) meat.**

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The fatty acid profiles and cholesterol levels of meat samples from emu birds of different ages were estimated. Age of the bird showed significant influence on the proportion of palmitic acid, oleic acid, palmitolic, stearic and linoleic acid. However, the total unsaturated fatty acid content was not affected by age of the bird. The proportion of palmitolic and oleic acid were increased with age, while palmitic, linoleic acids decreased with age. Total percent unsaturated fatty acid palmitic, palmitolic, stearic, oleic and linoleic acid and cholesterol contents of emu meat observed at 40, 50, 60 and 70 weeks of age were 23.74 ± 0.17 , 6.22 ± 0.17 , 9.65 ± 0.13 , 42.16 ± 0.30 , 19.01 ± 0.49 , 67.40 ± 0.21 and 52.81 ± 1.70 , respectively. The cholesterol content (mg/100g) was 42.84 at 40 weeks and increased to 60.74 at 70 weeks of age.

Quality characteristics and composition of frozen emu meat.

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Keeping in mind, the keen interest among emu farmers and consumers to know about emu meat, this need based research work was carried out to evaluate the composition, physico-chemical properties, histological characteristics, and microbial quality of frozen- thawed emu meat during refrigerated storage under aerobic and vacuum packaging conditions. The proximate composition indicated higher protein and ash content and lowest fat content in emu meat compared to meats from other meat animals. The pH, water holding capacity, collagen content and solubility, protein extractability, muscle fibre diameter and Warner-Bratzler shear force values are similar to the earlier reports for meats from other food animals. The emu meat is dark cherry red in colour with significantly higher myoglobin content and the myoglobin is more prone for oxidation as evidenced by higher initial metmyoglobin content. The initial thiobarbituric acid reactive substances (TBARS) values and % free fatty acids in emu meat were higher compared to meats from other species. The sodium dodecyl sulfate polyacrylamide gel electrophoresis results also indicated similarities of emu meat proteins with other meats. The initial total plate counts are also similar to those reported for other meat animal species. The study shows the potential of emu meat as a new source of low fat, quality meat proteins, however, more studies are required to elucidate the effect of age, sex, muscles, pre-slaughter and post-slaughter factors on different carcass and meat quality characteristics.

Age effect on feeding and idling behavior of weanling goat reared under stall-fed conditions.

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Weanling goats are slaughtered in developing countries mostly between the ages 9 to 12 months. Times spent feeding determines the nutrient uptake by goat, which in turn plays a large role in determining both quality and quantity of goat meat. But information on the feeding behavior of goat under stall-fed conditions is very limited. The aim of this study was to observe the feeding behavior of 18 stall housed weanling goats (9 males and 9 females) during each of three periods of their body growth viz. between 3 to 4 (G1), 5 to 6 (G2) and 8 to 9 months of age (G3). The experimental animals had free access to feed and fodder only during the daytime. The time spent eating forage increased significantly ($H_{2, 18} = 32.32, P < 0.001$) with the increase age of animals; the G3 age group spent about 7.45 h day⁻¹ in eating forage whereas the animals in the G2 and G3 age groups spent about 5.65 h day⁻¹. However the total time spent eating (both forage and concentrate) was more or less same (about 9 h day⁻¹) in all the three age groups. The total time spent on different idling activities (viz. loafing, resting and sleeping) during daytime was more or less same (about 1.8 h) in both the G1 and G3 goats; whereas it was higher (2.3 h) in the G2 goats.

Carcass traits of newly identified *Bareilly* goats reared under intensive rearing conditions.

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Majority (about 75%) of the Indian goat population is considered as mixed and non-descript, these animals are also well adapted to harsh climates, long migration, tropical diseases, poor nutrition and shortages of water. Among the non-descript goats, there may be some unidentified strains/breeds that have been evolved over ages to suit the specific agro-ecological conditions. A preliminary study reveals that a local black colored goat is used mainly for meat production in Tarai area. The Bareilly goats have black body coat with hair tuft in the breech, broad pendulous ear, twisted short horn and Roman nose. Body weight of these goats varies from 2 to 3 kg at birth, 8 to 10 kg at weaning, 10 to 15 kg at 6-9 months and 20 to 25 kg at Yearling. Keeping in view that no information on the carcass traits of Bareilly goat is available in the literature, a preliminary study was conducted at Indian Veterinary Research Institute, Izatnagar, Bareilly (UP) to study carcass traits (in male) of Bareilly goats under intensive rearing conditions. Nine (9) male goats (age 10-12 months), were slaughtered and carcass traits, viz. a) Carcass weight b) Carcass length c) Empty body weight (EBW) d) Dressing weight, e) Primary cuts (namely leg, loin, rack, breast and shank, shoulder and neck. f) Loin eye area, g) Organ weight, h) Edible weight (included the weight of carcass, liver, kidney, testes, dressed head and feet), i) Inedible offals and j) Bone, meat ratio were recorded. The mean slaughter weight, carcass weight and dressing percentage of Bareilly local goats was 15.39 ± 0.66 , 6.39 ± 0.34 kg and 41.41% and mean yields of slaughter products like head, feet and skin were 1.17 ± 0.04 , 2.16 ± 0.14 and 1.13 ± 0.07 kg and mean weight of internal organs heart, liver, kidney, spleen and testicles were 0.06 ± 0.0 , 0.29 ± 0.02 , 0.06 ± 0.0 , 0.16 ± 0.003 and 0.10 ± 0.01 kg and means of legs, G.I full, carcass length, neck, rack, flank, shoulder, breast and shank were 0.43 ± 0.02 , 4.04 ± 0.15 , 0.53 ± 1.0 , 0.5 ± 0.05 , 0.83 ± 0.05 , 0.29 ± 0.01 , 0.76 ± 0.05 , 1.35 ± 0.08 , 0.45 ± 0.02 kg respectively and % of bone, deboned and skin were 8.62, 12.94 and 7.3% respectively.

Effect of GDF8 gene polymorphism on carcass quality traits in broiler chicken.

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Growth differentiating factor-8 (GDF8) plays very crucial role in regulating muscular growth in chicken. The present study was carried to analyse the polymorphism in coding region of GDF8 gene and its association with the carcass quality traits in control broiler line maintained at PDP, Hyderabad. The PCR-SSCP and sequencing revealed 7 haplogroups with h1h3 and h1h4 possessing the lowest frequency (0.1) and h2h7 having the highest frequency (0.25). Haplogroups had the significant effect ($P=0.02$) on back muscle% where h2h4 group had the highest back yield (31.9%) and h1h3 had the lowest value (25.5%). However, the haplogroups did not show any significant effect on other carcass traits such as leg muscles%, neck %, wing muscle%, gizzard%, liver % spleen % heart % and bursa %. It is concluded that GDF8 gene was polymorphic and had significant association with back muscle% in broiler chicken.

1.34 Cost of food animal often exceeds the sale price of meat and the key to profitability is from byproducts - Evaluating the hypothesis.

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The widely held hypothesis in meat trade states that the cost of food animal often exceeds the sale price of meat and the key to profitability is from byproducts. The present study was undertaken to test this hypothesis for sheep and goats at Bareilly through collection of data on slaughter components and market price of live animals and various slaughter products. The mean yields of slaughter components for nondescript market slaughter sheep and goats were collected of either sex under two age (young and adults), three size (small, medium and large) and three conformation groups. Data were collected from 69 sheep and 59 goats. The overall mean slaughter and carcass weight of market slaughter sheep were 22.36 and 10.47 kg respectively. The overall mean slaughter and carcass weight of market slaughter goats were 19.98 and 19.51 kg respectively. In both species, slaughter and carcass weight increased progressively with progressive increase in size and conformation. The overall dressing percentage in sheep and goats was 46.66 and 47.45% respectively. Skin yield was higher in sheep (2.19 kg) than goats (1.39 kg). Omental fat yield was higher in goats (330 g) than sheep (150 g); Pluck yield was higher in sheep (950 g) than goats (820 g). Goats have heavier legs than sheep. The mean live animal price of male market slaughter sheep was considerably higher (Rs.901) than female sheep (Rs.815). However, the mean live animal price of female market goats was higher (Rs.780) than male goats (Rs.731). Overall mean live animal price of market slaughter sheep was higher (Rs.861) than goats (Rs.763). Sale value of meat was also higher in sheep (Rs. 988) than goats (Rs.884). Sale value of skin was very high in sheep (Rs.143) than goats (Rs.43). Sale value of gastrointestinal tract was higher in goats (Rs.33) than sheep (Rs.18), Sale value of sum of byproducts was higher in sheep (Rs.289) than goats (Rs.197) due to huge differential in skin price. Since the sale value of meat was higher than the purchase price of live animal in both sheep and goats, it is interpreted that the hypothesis of this study does not exist for small ruminants in this part of the country. Since the total sale proceeds in sheep and goats expressed as % of live animal price was found to be 149.37 and 146.01% respectively, it was concluded that small ruminants meat trade is a profitable enterprise.

1.35 IGF-1 Gene SNPs and its effect on carcass quality traits in broiler chicken
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IGF-1 is a hormone having similar molecular structure to insulin plays important role in juvenile growth with continuing anabolic effect in adult birds. An experiment was conducted to explore the effect of IGF-1 polymorphism on carcass quality traits in broiler chicken. The study was confined on 205 birds of control broiler chicken line maintained at Project Directorate on Poultry, Hyderabad. The coding region of IGF-1 gene encompassing 4 exons was screened for SNPs. A total of 16 haplotypes were found of which h1 haplotype was the most frequent (0.68) one and h11 was the least frequent haplotype in broiler population. The effect of haplogroup was significant ($P=0.023$) only on breast muscle%. The h1h6 haplogroup had the lowest breast muscle% while h1h1 and h1h8 had the highest value. The h1h1 and h1h6 haplogroup showed 22.0% superiority for this trait over the h1h6 haplogroup. The haplogroups did not show significant effect ($P<0.05$) on other carcass quality traits such as leg muscle%, back muscle%, neck%, wing muscle%, gizzard%, liver%, spleen%, heart% and bursa%. It is concluded that the SNPs of IGF-1 coding region had significant association with certain carcass quality trait in broiler chicken.

1.36 Evaluation of slaughter parameters in multi coloured mediocre broiler crosses

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The demand for a heavier bird for small scale intensive farming in peri urban and rural areas is assessed from the continuous feedback from the farmers at Project Directorate on Poultry. Four new promising multicoloured mediocre crosses (HC-1: Vanaraja X C1; HC-2: Vanaraja X C2; HC-3: PB-2X Gramapriya; HC-4: PB-2 X Vanaraja) were evaluated to cater to the needs of the farmers. In the present study, data on slaughter parameters collected from 24 birds at 12 weeks of age representing four mediocre broiler crosses was evaluated to identify their suitability as meat birds and meat characteristics. All the birds were maintained on broiler finisher diet on ad lib feeding till 12 weeks of age. The pre slaughter weight and dressed weight significantly ($P \leq 0.05$) varied among the four crosses HC-4 recorded significantly heavier pre slaughter and dressed weight (2164.83 ± 131.69 and 1526.67 ± 102.71 g). All cut up parts including breast, thigh, drumstick, wings significantly ($P \leq 0.05$) varied among the four crosses, except neck and back which showed non- significant differences. The total cut parts weight ranged from 1511.83 g (HC-4) to 1085.58 g (HC-2). HC-4 recorded significant ($P \leq 0.05$) higher weights for breast (353.16 ± 24.80 g), thigh (231.75 ± 23.37 g), drumstick (223.42 ± 13.98 g) and wings (172.00 ± 11.27 g). Significant higher bone less meat was obtained from HC-4 cross, which also recorded higher bone weight without any significant variation among the four crosses. The dressing percentage and bone less meat percentage both on pre slaughter weight and dressed weight were similar without any significant variations. The dressing percentage ranged from 70.39 in HC-4 to 68.89 in HC-2 cross. The skin, feather and blood did not show any significant differences among the crosses. The study concludes that, HC-4 cross can be a viable option for small scale intensive farming under peri urban and rural areas for meat purpose.

2.02 Comparative study on adipogenesis and fibrogenesis in skeletal muscle of Angus and Wagyu cattle

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Strengthening myogenesis (formation of muscle cells) enhances lean growth, promoting intramuscular adipogenesis (formation of fat cells) elevates marbling, and reducing intramuscular fibrogenesis (formation of fibroblasts and synthesis of connective tissue) improves not only the production efficiency but also overall meat quality. Intramuscular fat (marbling) and collagen content are major critical factors affecting palatability of beef, but mechanisms regulating intramuscular adipose and connective tissue deposition are far from clear. Japanese Wagyu cattle are well known for their extremely high marbling. The objective of this study was to evaluate intramuscular fat (IMF) and collagen deposition in the muscle of Wagyu (WA) compared to Angus (AN) cattle. Samples of sternomandibularis muscle were collected from WA (n = 3) and AN (n = 3) for molecular and immuno-histological investigations of adipogenesis and fibrogenesis. Our result shows that the expression of the adipogenic markers, CCAAT enhancer binding protein (C/EBP) α , peroxisome proliferator-activated receptor (PPAR) γ and Zinc finger protein (Zfp) 423 in Wagyu muscle were much higher ($P < 0.05$) than in Angus muscle, which was consistent with higher intramuscular fat deposition in Wagyu muscle ($P < 0.05$). In addition, more adipocytes and pre-adipocytes were detected intramuscularly in Wagyu cattle. Similarly, fibrogenesis was also enhanced in Wagyu cattle, with a higher expression of fibroblast growth factor (FGF) 2, FGF receptor 1, transforming growth factor (TGF) β , Collagen I and III compared to Angus cattle. Wagyu muscle had higher collagen content and lower collagen solubility. In addition, muscle fiber diameter was larger in Wagyu than in Angus cattle. These results clearly show that both intramuscular fat and collagen content are enhanced in Wagyu cattle, suggesting the possibility that the commitment of mesenchymal progenitor cells to adipogenesis and fibrogenesis is enhanced in Wagyu cattle.

2.03 Effect of feeding encapsulated and non-encapsulated *Pediococcus acidilactici* on breast muscle pH, bone biochemical profile and sensory scores of broiler meat

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An attempt was made to evaluate the effect of feeding encapsulated and non-encapsulated *Pediococcus acidilactici* on breast muscle pH, bone biochemical parameters (tibia length, tibia weight and tibia ash) and sensory evaluation scores of meat samples in commercial male broiler chicks. Group 1 was fed with control feed (without supplementation of any probiotic organism), group 2 was fed with non-encapsulated *P.acidilactici* @ 10⁶ cfu/g supplemented diet. Groups 3 and 4 were fed with encapsulated *Pediococcus acidilactici* diets @ 10⁶ cfu/g and 10⁹ cfu/g, respectively. The breast muscle pH estimated on 42nd day revealed significantly higher pH value in group 1 compared to groups 2, 3 and 4. However, there was no significant difference in breast muscle pH between groups 1 and 2, while group 3 was comparable with both groups 2 and 4. Broilers fed on encapsulated *P.acidilactici* supplemented diets (group 3 and 4) showed a significantly (P<0.05) higher simple index of tibia, more tibia length and more tibia weight compared to groups 2 and 1. The sensory evaluation results showed that sensory scores for group 4 were higher compared to all other treatment groups. There were no significant differences between the sensory evaluation scores of groups 3 and 4. Thus, supplementation of encapsulated *P. acidilactici* at different levels resulted in better meat quality compared to other group of broilers.

2.07 Evaluation of functional parameters of Black turkey, Beltsville small white turkey and Broiler spent hen meat

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In present study functional meat quality characteristics of dark and white meat from all three groups i.e. female Black turkey (BT), female Beltsville small white turkey and spent hens were studied. Turkey meat had significantly higher water holding capacity than the meat from broiler spent hens. The emulsifying capacity was significantly lower ($P < 0.01$) in dark meat of Black turkey than its white meat as well as dark and white meat of Beltsville small white turkey and broiler spent hens. The emulsifying capacity of dark and white meat of each bird did not differ significantly ($P > 0.05$). Extractable proteins of dark meat and white meat of Black and Beltsville small white turkey did not differ significantly ($P > 0.05$). The extractable proteins of dark meat of broiler spent hens were significantly lower ($P < 0.01$) than dark and white meat of Black turkey and Beltsville small white turkey. Myoglobin is the pigment found in the muscle. It was found to be significantly ($P < 0.01$) higher in dark meat than white meat in all three types of birds. The myoglobin of Black turkey's white and dark meat was significantly higher ($P < 0.01$) than white and dark meat of Beltsville small white turkey and broiler spent hens.

2.11 Histology of fresh and frozen-thawed rabbit meat

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Present investigation was carried out with a view to ascertain histology of fresh and frozen-thawed rabbit meat. Rabbit meat samples were collected from retail shop and studied for histological changes. It is observed from histological studies of fresh rabbit meat, that it did not show any appreciable changes in muscle fibers. The fresh rabbit meat showed tremendous histological changes on subsequent storage in freezer. At 15th day of storage of rabbit meat, the muscle fiber showed mild kinking along with mild separation and initiation of breaking of muscle fibers. On 30 day storage, separation of muscle group with longitudinal spaces and appearance of transverse breaks were noticed. The cause of a transverse break might be due to physical stress produced by contraction and by action of autolytic enzymes. Freezing of tissue involves essentially three major possibilities of damage (Casseans, 1971) cellular puncture or rupture by formation of ice crystals, damage to the cell by production of increased osmotic pressure and invisible precipitation or denaturation of colloidal cell constituents. In 45 days stored muscle, the muscle fibers were observed to shows pronounced shrinkage with extensive damage, characteristic tearing with widened gaps inbetween. The occasional hyalanisation was noticed in the samples on 45th day of frozen storage, which is indicative of denaturation of protein, which might have contributed in reduction of muscle protein level. 60 days frozen muscle showed a great separation of muscle groups and the muscle fibers have undergone a different configuration with pronounced increase in structural damage. The severe structural damage might be due to formation of intracellular ice crystals exerting pressure in opposite direction and tearing the muscle fiber. The prominent nucleus retaining H&E stain in all plates shows that, the tissue were not necrosed at any extent. Indirectly, it showed the palatability characteristic of the meat.

Note: Part of M.V.Sc thesis submitted to MAFSU, Nagpur

2.14 Carcass traits and meat quality attributes of market broiler chicken of different body weights.

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An experiment was carried out to study the effect of body weight of broiler chicken on carcass traits and meat quality attributes. Broiler chickens of three body weight groups (small-1.5, medium - 2.0 and heavy - 2.5 kg) comprising 12 birds (6 males and 6 females) from each group, i.e a total of 36 birds were obtained from retail markets of Hyderabad. Carcass traits revealed higher slaughter and dressed carcass weight for males compared to females. The mean live weight (kg), dressed carcass weight (kg), dressing percentage, boneless meat yield (%) of small, medium and heavy body weight group were 2362.92, 1976 and 1533.17; 1685.1, 1372.01 and 1037.4; 71.29, 69.3 and 67.66 & 32.65, 30.36 and 28.94, respectively. The yield (%) of high valued primal cuts like breast, thigh, drumstick and

**A COMPARATIVE STUDY ON MEAT QUALITY OF THREE INDIAN
GOAT BREEDS**

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Ten Barbari, 6 Jamnapari and 4 Marwari male goat kids weighing from 20 to 23 kg were slaughtered in the Institute's experimental slaughterhouse to study their meat quality. The pH, water holding capacity, cooking loss, shear force value and organoleptic evaluation of Longissimus dorsi (LD) and Semimembranosus (SM) muscles were assessed for comparative meat quality evaluation. The results showed that pH of the muscles were in the range of 5.67 to 5.86 while SM muscle had higher ultimate pH in all the three breeds compared to LD muscle. SM muscle showed comparatively higher water holding capacity and lower cooking loss though the difference was not significant. There was no significant ($P>0.05$) difference in shear force values among breeds and muscles but SM muscle was comparatively less tender as indicated by shear force value. Sensory evaluation of the two muscles of the three breeds revealed that meat from Barbari received better overall acceptability over other two breeds. Sensory tenderness score followed the similar trend as shown in instrumental texture measurement. Juiciness was higher in SM muscle compared to LD muscle probably due to its higher total fat content as fat has positive relationship with juiciness and overall acceptability. Among the three breeds, Barbari showed superior quality of meat based on the organoleptic evaluation.

**ASSESSMENT OF HARVEST AND POST-HARVEST
LOSSES IN BUFFALO MEAT SECTOR: I. HARVEST
(PRE-SLAUGHTER AND SLAUGHTER) LOSSES AT THE
LEVEL OF BUFFALO MEAT TRADERS**

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A study was conducted at the buffalo slaughterhouse, Bareilly (UP) to assess the harvest (pre-slaughter and slaughter) losses at the level of buffalo meat traders (BMT) using a structured interview schedule. Out of a total of 50 BMT, 10 respondents were surveyed, 5 each in small category BMT and large category BMT. The information was collected at monthly intervals over a continuous period of one year. The respondents bought and slaughtered 1407 buffaloes comprising 956 she buffaloes (SBs), 437 he buffaloes (HBs) and 11 male buffalo calves (MBCs). Pre-slaughter losses included injuries in 10 animals (8 SBs+2 HBs), illnesses in 5 animals (4 SBs+1HB) and death in one animal (SB). No losses were observed in MBCs. It was observed that injuries occurred in 7 animals during transport by truck and 3 during transport on foot. 4 cases of illness were reported, two each during transport by truck and during holding period and the fifth case occurred during transport on foot. The single case of death occurred during transport on foot. Quantum of pre-slaughter losses were almost double in SBs than in HBs. Incidences of injuries were higher (1.39%) in rainy (kharif) season followed by summer (zaid) (0.54%) and winter (rabi) (0.19%) seasons. Slaughter losses were due to condemnation of meat, condemnation of offals and hide defects during slaughter and dressing operations. Condemnation was higher in forequarters (0.04%) than in hindquarters (0.01%). The condemnation of offals were 0.48% in heart, 1.25% in liver, 0.81% in kidneys and 0.35% in udders. No condemnation was observed in head, stomachs and feet. Hide defects consisted of skin infections in 3 animals (0.21%), skin bruises in 8 animals (0.56%) and flaying cuts in 7 animals (0.49%). No hide defects were observed in MBCs. Offals condemnations were highest (0.17%) in summer (zaid) followed by winter (rabi)(0.12%) and rainy (kharif) (0.08%) seasons. Higher losses (0.19%) were observed in small category BMT than in large category BMT (0.05%).

PERCEPTION OF FARMERS ON CONSUMPTION OF RABBIT MEAT.

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A study was undertaken to know the perception of farmers on consumption of rabbit meat (fryer) in Tamil Nadu, by using a structured questionnaire as tool for the data collection. The data was collected randomly from among 352 farmers who had visited the outreach center of TANUVAS to seek advise on farm related activities. The result showed that nearly two-thirds (60.15 per cent) of the respondents had tasted fryer. Among them 72.30 per cent reported that the texture and taste was soft and good. Over one-half (51.64 per cent) of them consumed home cooked fryer followed by one-fourth (24.88 per cent) at restaurant and rest at residence of their friends (23.47 per cent). Over two-fifth (42.33 per cent) of the respondents expressed that the rabbit meat was not commonly available in the market as compared to chicken and mutton. They attributed that this unpopularity was due to maintaining rabbit as a pet (30.68 per cent), low level of production (31.25 per cent) and lack of creating awareness through advertisement (34.38 per cent) responses. Nearly two- third (66.76 per cent) were aware about the nutritive value of the rabbit meat and an overwhelming (93.46 per cent) farmers showed interest to undertake rabbit farming as a source of livelihood due to unemployment, high rate of returns and easy management. The study indicated that, rabbit meat has substantial demand and is preferred by the consumers interms of taste and nutritive value. Since, the meat in not available freely in the market efforts may be taken by marketing agencies to create awareness and make the product available to consumers. Further unemployed youth and farmers may be encouraged to undertake this venture of rabbitary as an enterprise .

COMPARATIVE STUDY ON CARCASS CHARACTERISTICS OF GUINEA FOWL (PEARL) AND DESI FOWL (KADAKNATH)

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With the increase in demand of processed products by consumers and with focused concentration of Government on food processing industry, poultry is going to be one of the fastest growing sectors of food industry. Hence, there is a need of all round research on resources present in the poultry industry of the country. Attempts are, therefore made to compare Guinea fowl (Pearl) and Desi fowl (Kadakhnath) for the carcass and meat quality. Based on meat yield, cut-up yield and by-product yield, Pearl was found to be superior to Kadakhnath at 8, 12 and 16 weeks of age. Increase in age of birds also resulted in increase in above yields in both Kadakhnath and Pearl. Physico-chemical analysis of raw meat revealed that Kadakhnath was significantly ($P < 0.05$) higher in ether extract percent and non-significantly higher in ash percent at 8, 12 and 16 weeks of age. It was also found that Kadakhnath was non-significantly lower in moisture percent, protein percent and water holding capacity (WHC) percent than Pearl at 8, 12 and 16 weeks of age. Increase in age of birds resulted in increase in protein percent, ether extract percent and ash percent, but this increase was found non-significant in majority of the cases. Decrease in moisture percent and WHC percent was observed with the increase in age of birds in both Kadakhnath and Pearl, however this decrease was significant ($P < 0.05$) in WHC percent in all the cases but was significant ($P < 0.05$) for moisture percent in some cases.

CARCASS AND MEAT CHARACTERISTICS OF GEESE IN KASHMIR

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Quantitative carcass and meat characteristics of adult geese produced in Kashmir were studied. The results pertaining to slaughter characteristics and yields indicated that male geese had significantly higher ($P<0.05$) pre-slaughter, bleeding-out, defeathered, dressed and ready-to-cook weights compared to the female geese, the values (male/female) being 3.60/3.34, 3.44/3.12, 3.18/2.89, 2.40/2.17 and 2.66/2.40 kilograms respectively. However, the differences between sexes were non-significant for dressing percentage (66.72/65.19), evisceration loss percent (14.96/14.43) and ready-to-cook yield percent (73.83/72.01). With regard to yield characteristics of giblets and other main by-products of geese, the results were significant only with respect to heart weight and blood yield percent, the former being higher ($P<0.05$) in the males (27.10/24.30 g) and the latter being higher ($P<0.05$) in the female geese (4.26/6.36). Non-significant differences were found between the sexes for most of the cuttability characteristics. However, the total weight of cut-up parts was significantly higher in the male geese (2.33/2.12 kg). This was also reflected in the yield of meat component of the carcass, as the total meat component obtained from the carcasses on manual deboning was significantly higher in males (996.80 g) as compared to the females (902.50 g). Meat: bone ratio was also significantly higher ($P<0.05$) in the male breast cut (5.18) compared to the female counterpart (4.22).

ASSESSMENT OF HARVEST AND POST-HARVEST LOSSES IN
BUFFALO MEAT SECTOR: III. POST-HARVEST (POST-
SLAUGHTER) LOSSES AT THE LEVEL OF BUFFALO OFFAL MEAT
STALLS

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Out of a total of 24 retail buffalo offal meat stalls (BOS) in Bareilly (UP), 6 were surveyed (3 each in small category BOS and large category BOS). Buffalo offal meats were broadly categorized into two types: (i) "Regular Offals" comprising tongue meat, head meat, rumen meat and heart meat and (ii) "Other offals" comprising liver, kidneys, udders, brain and feet. Post-slaughter losses consisted of condemnation of offal meats either due to lesions or spoilage. The above two losses in tongue meat, head meat, rumen meat and heart meat were 0.18 & 0.76%, 0.35 & 0.29%, 0.33 & 1.07% and 1.45 & 1.13%, respectively. The corresponding data for liver, kidneys, udders and brain were 2.23 & 1.15%, 2.03 & 3.24%, 0.29 & 0.62% and 0.23 & 0.89%, respectively. No losses were reported in feet. Losses were higher (4.40%) in large category BOS than in small category BOS (3.06%). Maximum losses (2.85%) occurred in summer (zaid) and minimum losses (0.35%) in winter (rabi) with 1.04% losses in rainy (kharif) season.

ARCASS YIELD AND MUSCLE COMPOSITION OF BROILER FED PEARL MILLET BASED DIET.

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An experiment (6 weeks) was conducted to study the effect of processing and enzyme supplementation in pearl millet based broiler's diet. The carcass yield and muscle composition of broilers were also studied. Day old broiler chicks (n=400) were randomly distributed into ten treatments having two replicates each. Control T₁ (Maize-soybean based diet) was as per BIS (1992) whereas T₂ (66% maize replaced with pearl millet), T₃ (100% maize replaced with pearl millet), T₄ (T₁ + multienzyme), T₅ (T₂ + multienzyme), T₆ (T₃ + multienzyme), T₇ (66% maize replaced with reconstituted pearl millet), T₈ (100% maize replaced with reconstituted pearl millet), T₉ (T₇ + multienzyme) and T₁₀ (T₈ + multienzyme). The starter ration (0-4 weeks) and finisher ration (4-6weeks) were formulated. Four birds per dietary treatment were selected randomly for carcass trait evaluation. After recording live weights, the birds were killed by severing the jugular vein and allowed to bleed completely following "Halal" method, their heads were removed at the atlanto-occipetal joint and shank at hock joint. The dressing was done by removing skin and feathers. Dressed birds were then eviscerated by removing the crop, trachea and viscera as a whole. The lungs were scrapped off and the heart, liver and gizzard constituting giblets, were removed carefully from the viscera. The gizzard was opened and its contents were washed out and inner epithelial lining were discarded. The heart was made free from blood clots and adhering vessels. Eviscerated percentage, giblet yield and drawn percentage were recorded. Separate weights of heart, liver and gizzard were also recorded and their relative weights (percentage of live weight) were then calculated. The dressed yield ranged from 71.78-74.78 percent of live weight. There was non-significant difference in dressed yield in various treatments. The highest eviscerated yield was observed in treatment (T₅) and lowest in T₁ having statistically non-significant differences. The giblet yield was highest in T₇ (6.12) and lowest in control group. Non-significant differences in dressing yield were observed in pearl millet and reconstituted pearl millet based diet. However, numerically improved drawn yield in pearl millet based diet was observed as compared to control. The relative weight (% of live weight) of heart, liver and gizzard were statistically similar in all treatments. The moisture, crude protein and ether

extract content did not differ significantly in thigh and breast muscle. So it was concluded that dressed yield, eviscerated yield, drawn yield, giblet yield, relative weight (% of live weight) of heart, liver and gizzard and composition of thigh and breast muscle were not affected by replacement of maize with different level of pearl millet as such, reconstituted or supplemented with enzymes.

MUTTON AND CHEVON MARKETING SYSTEM IN TAMIL NADU

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The mutton and chevon marketing system in Tamil Nadu was analysed for the marketing channels involved and for the monthwise transaction of mutton/chevon. The data were collected from 120 sheep and goat farmers from Salem, Sivagangai, Thoothukudi and Thiruchirappalli districts. Based on the number of small ruminants holding, the sample farmers were categorized into small farms (10 - 25 sheep/goat), medium farms (26 - 40 sheep/goat) and large farms (more than 40 sheep/goat). The collected data was analysed and the results revealed that there were primarily four marketing channels identified in the study area.

Channel I Producer - Commission Agent - Wholesale Butcher -

Retail Butcher - Consumer

Producer - Local village Trader - Wholesale Butcher -

Channel II Retail butcher - Consumer

Producer - Wholesale butcher - Retail butcher - Consumer

Producer - Retail butcher - Consumer

Channel III

Channel IV

It was noted that out of the 45 small farmers, majority of them (35.56 per cent) sold their sheep/goat through channel IV followed by channel II (31.11 per cent). Most the medium category farmers sold their sheep/goat through channel I (40.00 per cent). For the large category farmers also channel I (31.67 per cent) was the main marketing channel. The overall analysis revealed that most of the farmers preferred channel I in the study area. The study also revealed that volume of mutton/chevon transacted remains almost static over different seasons of the year and was the highest during January (9.05 per cent) and lowest in August (7.45 per cent).

EFFECT OF REFRIGERATED STORAGE ($4\pm 1^{\circ}\text{C}$) ON pH, THIOBARBITURIC ACID REACTIVE SUBSTANCES, SULFHYDRYL CONTENT, COLLAGEN CONTENT AND PERIMYSIAL CONTENT IN SPENT LAYERS' BREAST MUSCLE

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An experiment was conducted to study the effect of refrigerated storage ($4\pm 10^{\circ}\text{C}$) on pH, thiobarbituric acid reactive substances (TBARS), sulfhydryl (SH) content, collagen content and perimysial content in breast muscle of spent layers. Breast muscle of ten spent layers (75 weeks old) were collected from commercial poultry processing units and immediately, within an hour of slaughtering, trimmed off the connective tissues and fat, equally divided into 5 lots, and dipped in 1mM NaN_3 solution before being kept in refrigerated storage ($4\pm 10^{\circ}\text{C}$). Muscle samples were removed on 0 day, 7 days, 14 days, 21 days, 28 days, and analyzed for pH, TBARS, SH content, collagen content and perimysial content. Results showed that the pH, SH content, total collagen content and perimysial content decreased while TBARS and soluble collagen content increased over the period of time. It was observed that pH values varied from 5.73 to 5.30, total SH content (mM/g muscle) varied from 3.51×10^{-3} to 1.83×10^3 , total collagen content (mg /100g muscle) varied from 72.77 to 53.16 and perimysial content (mg collagen/100g muscle) varied from 113.16 to 72.50. While the TBARS (mg malonaldehyde/kg muscle) varied from 0.55 to 1.9 and the soluble collagen content (mg/ 100g muscle) varied from 4.68 to 11.07. Storage time had significant ($P < 0.05$) effect on these above parameter, and the TBARS was positively ($P < 0.05$) correlated with soluble collagen content. While total SH content was negatively ($P < 0.05$) correlated with TBARS. It is concluded that during refrigerated storage of spent layers' breast muscle, collagen degradation may be influenced by TBARS.

CARCASS TRAITS OF JAMUNAPARI AND TELLICHERRY MALE GOATS

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Carcass traits of the Jamunapari and Tellicherry male goats maintained at the Model Livestock farm of the Veterinary College and Research Institute, Namakkal were studied. A total of 16 Jamunapari and 38 Tellicherry males were slaughtered by humane method in the model slaughterhouse of the Department of Meat Science and Technology. Irrespective of age, the mean slaughter weight, hot carcass weight and dressing percentage were higher in Tellicherry males (18.53 kg, 8.3 kg and 43.94%, respectively) than Jamunapari males (17.02 kg, 7.23 kg and 41.76%, respectively). Dressing percentage in Tellicherry males was significantly ($P < 0.05$) higher than Jamunapari males. The mean bleeding percentages in Jamunapari and Tellicherry males were 3.96 and 4.15%, respectively. The mean total percent yield of inedible (blood, head, skin and feet) offal based on slaughter weight in Jamunapari and Tellicherry males were 24.27 and 23.24, respectively. The mean total percent yield of edible offal (liver, heart, spleen, trachea and lungs, kidney, testicle and empty stomach and intestine) based on slaughter weight in Jamunapari and Tellicherry males were 31.4 and 26.37, respectively. The mean percent yield of saleable meat with bones in Jamunapari males was 91.47 and that in Tellicherry was 88.73%.

SLAUGHTER AND DRESSING YIELD IN MECHERI SHEEP.

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Slaughter and dressing yield of the Mecheri sheep (46 males and 8 females) maintained at the Model Livestock farm of the Veterinary College and Research Institute, Namakkal was recorded. The sheep were slaughtered by humane method in the model slaughterhouse of the Department of Meat Science and Technology. Irrespective of age, the mean slaughter weight, hot carcass weight and dressing percentage were higher in males (20.93 kg, 9.62 kg and 45.34%, respectively) than females (11.75, 4.97 kg, and 42.34 %, respectively). Dressing percentage in males was significantly ($P<0.05$) higher than females. The mean bleeding percentages in males and females were 3.80 and 3.75 %, respectively. The mean total percent yield of inedible offal (blood, head, skin and feet) based on slaughter weight was higher in females (25.35) than males (24.82). The mean total percent yield of edible offal (liver, heart, spleen, trachea and lungs, kidney, testicle and empty stomach and intestine) based on slaughter weight were higher in males (25.81) than females (19.66). The mean percent yield of saleable meat with bones was higher in males (93.77) than females (89.53). The percent losses (evaporative and cutting) were higher in females (10.47) than in males (6.23).

SLAUGHTER AND DRESSING YIELD IN LARGE WHITE YORKSHIRE PIGS

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Large White Yorkshire pigs (33 males and 34 females) received from the Model Livestock farm of the Veterinary College and Research Institute, Namakkal were slaughtered by humane method in the model slaughterhouse of the Department of Meat Science and Technology. Irrespective of age, the mean slaughter weight, hot carcass weight and dressing percentage were higher in females (77.28 kg, 56.70 kg, and 71.52 %, respectively) than males (66.25 kg, 45.50 kg and 66.44 %, respectively). The dressing percentage was significantly ($P<0.01$) higher in females than males. Mean bleeding percentages in males and females were 1.34 and 0.97 %, respectively. The mean percent yield of saleable meat with bones was higher in males (77.57) than females (77.15). The percent losses (evaporative and cutting) were higher in females (2.82) than in males (2.27).

SLAUGHTER AND DRESSING YIELD IN BROILER RABBITS

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Slaughter and dressing yield in two breeds of broiler rabbits were studied. Soviet chinchilla males (79) and females (51) and White giant males (73) and females (18) received from the Model Livestock farm of the Veterinary College and Research Institute, Namakkal were slaughtered by humane method in the model slaughterhouse of the Department of Meat Science and Technology. Irrespective of age, the mean slaughter weight, hot carcass weight and dressing percentage of Soviet chinchilla males were 2.79 kg, 1.11 kg and 52.91, respectively and in females were 2.5 kg, 1.37 kg and 54.51 %, respectively. Mean slaughter weight, hot carcass weight and dressing percentage of White giant males were 1.98 kg, 1.02 kg and 51%, respectively and in females were 2.28 kg, 1.14 kg and 49.85 %, respectively. The dressing percentage in Soviet chinchilla females was significantly ($P<0.01$) higher than males while that in White giant it was not significant. The mean percentage yield of edible offal (liver and kidneys) based on hot carcass weight in Soviet chinchilla males and females were 5.76 and 7.39, respectively; whereas in White giant males and females they were 7.05 and 7.82, respectively.

EFFECT OF FOOD WASTE ON CARCASS CHARACTERISTICS OF CROSSBRED BARROWS.

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An investigation was carried out to study the effect of human food waste on carcass characteristics of crossbred barrows. Eighteen castrated weaned piglets (approx. 10 kg body weight) were grouped into 3 dietary treatment groups consisting of 3 replicates of 2 animals in each chamber. Animals were fed up to slaughter weight (60 ± 5 kg). Animals in treatment 1 (Control) were fed conventional grain based diet comprised of maize, wheat bran, fishmeal, deoiled soyabean meal, mineral mixture and common salt as 35, 47, 6, 10, 1.5 and 0.5%, respectively. Treatment 2 was provided ad libitum food waste and a combination of ration comprised of 25% of conventional ration plus ad lib food waste in Treatment 3. Food waste alone or in combination with conventional ration had no significant effect on yield of primal cuts viz., shoulder, loin, ham and belly. Dressing percentage was comparable between treatment groups but numerically there was 1.41 and 2.84 % increase in Treatment 2 & 3. Back fat thickness was significantly ($P < 0.05$) increased in Treatment 2 and 3 (17 and 22% respectively). Likewise loin eye area was found to be reduced in Treatment 2 and 3 (4 & 9% decrease respectively) compared to control group. From the above study it was observed that there is no significant difference in the yield of major cuts between the different dietary treatment groups.

ECONOMICS OF PORK PRODUCTION BASED ON FOOD WASTE.

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Feed cost in pork production is very high (approximately 70-75% of total recurring cost). Unconventional feed sources like food waste is a regular practice in pig feeding. To calculate the production cost in regards to food waste as feed in pig, 3 groups of barrows consisting of 6 animals in each group were raised on 3 different diets starting from weaning (Approx. 10 kg BWT) to market weight (60 ± 5 kg BWT). Animals in Treatment 1 (Control) were fed standard conventional grain based diet, ad libitum food waste in Treatment 2 and a combination of ration comprised of 25% of conventional ration plus ad lib food waste in Treatment 3. Cost of production in terms of feed cost per Kg live weight was calculated to know the economics of production. Feed cost/kg of live weight was significantly ($P<0.01$) reduced in treatment 2 (Rs.5.06), followed by Treatment 3 (Rs.10.37) and highest in Treatment1 (Rs.32.46). Likewise, feed cost/kg of dressed weight was also markedly reduced in food waste groups (Rs. 7.44 &15.25 in Treatment 2 &3 respectively) compared to Control group (Rs. 47.73). Production cost in terms of feed cost of two economically important cuts (Loin and Ham) was also significantly ($P<0.01$) decreased in Treatment 2&3 compared to control group. It was observed that feeding food waste to crossbred pigs has significantly reduced the cost of production by lowering the feed cost.

ASSESSMENT OF HARVEST AND POST-HARVEST LOSSES IN
BUFFALO MEAT SECTOR: II. POST-HARVEST (POST-
SLAUGHTER) LOSSES AT THE LEVEL OF RETAIL BUFFALO
MEAT STALLS

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Out of a total of 131 retail buffalo meat stalls (BMS) in Bareilly (UP), 30 were surveyed comprising 6 small category BMS, 16 medium category BMS and 8 large category BMS. During the one year period of survey, these BMS sold 1,11,867 Kg of forequarters and 1,16,178 Kg of hindquarters. Post-slaughter losses consisted of condemnation of meat due to lesions. In all, 54 kg meat was condemned in forequarters (0.04%) and 76.5 Kg in hindquarters (0.06%). Condemnation losses were 0.85% in liver, 0.24% in kidneys, 1.30% in udders and 0.30 in brain. No losses were reported due to condemnation in feet, heart meat, rumen meat and head meat. Losses due to spoilage of meat were 36 Kg in forequarters (0.03%) and 37 Kg. in hindquarters (0.03%). Spoilage losses in offal meats were 1.06% in liver, 1.61% in kidneys, 1.68% in udders, 4.39% in rumen meat and 10.0% in head meat. Startwise, higher losses (0.10%) were observed in medium category BMS than in small category and large category BMS (0.07% in each). Seasonwise, maximum losses (2.07%) were observed in zaid followed by kharif (1.87%) and rabi (0.40%) seasons.

CARCASS CHARACTERISTICS OF COMMERCIAL BROILERS AS INFLUENCED BY STOCKING DENSITIES

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A trail was conducted using 240 commercial broiler chicks to study the effect of different stocking densities viz, 900, 750, 600 and 450 cm² per bird under deep litter system of *National Symposium on Prospects and Challenges in Indian Meat Industry, July 27-29, 2006* management on the carcass characteristics. Significant ($P < 0.01$) differences in per cent New York dressed weight, eviscerated weight, ready-to-cook yield, skin and meat yield were noticed between the broilers reared under different densities. The per cent New York dressed weight was higher (94.29 ± 1.41) in 750cm² per bird density, followed by 600cm² (91.65 ± 0.28), 450cm² (89.66 ± 0.77) and 900cm² (89.55 ± 1.19). Higher eviscerated weight (77.72 ± 2.15) was recorded in 750 cm² per bird density group followed by 600cm² (76.21 ± 1.27), 900cm² (75.00 ± 0.86) and 450cm² (68.75 ± 0.81). The per cent ready-to-cook yield was found to be higher (82.19 ± 2.16) in 750 cm² per bird density, followed by 600 cm² (81.03 ± 1.42), 900cm² (79.89 ± 0.91) and 450cm² (73.22 ± 0.89). Percent meat yield was higher (59.89 ± 0.89) in 900 cm² per bird density, followed by 450cm² (54.70 ± 0.59), 600cm² (54.33 ± 0.57) and 750cm² (52.13 ± 0.62). Higher skin yield (14.45 ± 0.14) was observed in 600 cm² per bird density, followed by 750cm² (12.74 ± 0.84), 450cm² (10.60 ± 0.38) and 900cm² (10.08 ± 0.27). The per cent bone yield was significantly ($P < 0.05$) higher (29.19 ± 1.03) in 750 cm² per bird density, followed by 450cm² (28.05 ± 0.76), 600cm² (25.65 ± 1.23) and (23.96 ± 1.40) 900cm². The remaining parameters such as per cent yield of trimmable fat, giblet, back, breast, wings, thigh, drumstick, fat pad thickness and breast angle were did not show any significant ($P > 0.05$) difference.

EFFECT OF DIFFERENT HOUSING SYSTEMS ON THE CARCASS CHARACTERISTICS OF LARGE WHITE YORKSHIRE PIGS

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A study was conducted at Livestock Research Station, Kattupakkam to assess and compare the growth performance and carcass characteristics of twenty four Large White Yorkshire weaned pigs in different housing systems like Intensive, Semi-Intensive and Extensive systems. Body weight, feed intake and feed efficiency were calculated fortnightly interval. Slaughter study and sensory quality analysis were conducted at the end of the experiment at 180 days of age. There was no significant difference in the final weight and weight gain, feed intake and feed efficiency of the pigs between the three different housing systems. The carcass traits like carcass weight, dressing percentage, carcass length, ham, shoulder, loin eye area, and loin weight of pigs reared under different housing system did not differ significantly, but extensive system of rearing significantly ($P<0.01$) produce thinner back fat thickness (0.95 ± 0.05) than the semi intensive and intensive system of rearing. Meat ($P<0.05$) and fat ($P<0.01$) percentage were also showed significant difference in the extensive system of rearing. Sensory quality analysis, the extensive system showed the significantly ($P<0.01$) higher score for the tenderness than the semi- intensive and extensive system of rearing. Juiciness is significantly ($P<0.05$) higher in the Semi-Intensive system than the extensive and intensive systems of rearing. The results revealed that the rearing system (intensive, semi-intensive and extensive system of housing of pigs) had no influence on growth performance and carcass traits, but the extensive system of rearing pigs produce a thinner back fat content than intensive and semi intensive system of rearing pigs due to exposure of physical activity in the natural atmosphere.

EFFECT OF FEEDING COMPLETE DIET WITH VARIOUS PROPORTION OF ROUGHAGE TO CONCENTRATE RATIOS ON CARCASS QUALITY OF MADRAS RED LAMBS

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An experiment was conducted to assess the performance of twenty four Madras red lambs under feed lot system with complete diet of three different roughage to concentrate ratios viz. high forage (HF) 60:40, medium forage (MF) 50:50, low forage(LF) 40:60 and control group (grazing with supplementation). The parameters studied were feed consumption, body weight, average daily gain, feed efficiency and carcass traits. At the end of the 90 days feeding period, lambs were slaughtered as per standard procedures. The lambs maintained under low forage group had significantly ($P<0.01$) higher dressing percentage (47.08 ± 0.99) than the other experimental groups viz. medium forage group (44.83 ± 0.49), high forage (42.39 ± 0.53) and control group (40.3 ± 0.099). Among the yield of offals blood, liver, lungs and gut percentages (3.5 ± 0.13 , 2.4 ± 0.06 , 1.75 ± 0.018 and 8.25 ± 0.1 respectively) were significantly higher in low forage group than the lambs under other treatment groups. The percentage of all primal cuts viz. shoulder, neck, rib, loin, breast, flank and legs (20.62 ± 0.46 , 3.58 ± 0.158 , 11.1 ± 0.43 , 9.88 ± 0.33 , 7.38 ± 0.18 , 2.84 ± 0.11 and 30.05 ± 0.68 respectively) were significantly higher in low forage group than the lambs under other treatment groups. The percentage of meat (64.17 ± 0.39) and fat (7.35 ± 0.29) and also the loin eye area (9.08 ± 0.017) were significantly ($P<0.01$) higher in low forage group. The high forage group had significantly ($P<0.01$) higher percentage of bone (32.62 ± 0.25) than the other experimental groups.

PHYSICO-CHEMICAL COMPOSITION OF LAMB, SPENT GOAT MEAT AND COMBINATION OF LAMB AND GOAT MEAT (50:50)

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Muzaffarnagari lambs (age 9m) and spent goat meat (age approximately 5 years) reared under semi-intensive system at Central Institute for Research on Goats, Makhdoom were slaughtered and meat quality characteristics were evaluated to study the effect of combination of meat of lambs and spent animal for the value added product preparation. The l. dorsi muscle was removed, packed in HDPE bags and stored at $-18\pm 20^{\circ}\text{C}$ to evaluate differences, if any in the meat of lamb, spent goat meat and their combinations in the ratio of 50: 50 for physico- chemical properties and total cholesterol content. Fat content of spent goat meat was lower (2.18) than lamb meat (4.76 %). Extract release volume was lower in spent goat meat thus more water holding capacity. Combination meat had more WHC (58.52 %) than others. Total cholesterol content (mg/100g) of spent meat was lower than lamb meat suggesting use of spent goat meat as fat replacer of lamb meat. The water activity, pH and total cholesterol content (mg/100g) of lamb meat were 0.995, 5.74 and 62.63. Spent goat meat had a_w , pH and cholesterol content of 0.996, 5.88 and 48.13 mg/100g respectively. It can be concluded that combination of meat of lamb and spent goat meat (50:50) can be utilized for value added product preparation because of better water holding capacity.

CONSUMPTION PATTERN OF JAPANESE QUAIL PRODUCTS: A SURVEY AMONG RESIDENTS OF CHENNAI METROPOLITAN

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A study on the consumption pattern of Japanese quail products was undertaken in order to understand the socio-economic characteristics of the Japanese quail consumers, their consumption pattern and factors influencing the consumption in Chennai Metropolitan

by interviewing 60 sample households. The data so collected was tabulated, analysed and interpreted suitably. Among the 60 households, majority of the respondents are of old age having collegiate level of education, with a family size of 4 to 6 members earning between Rs. 6001 to 12,000. Most (71.67 per cent) of them were Hindus. Majority (81.67 per cent) of the respondents consumed only quail meat for which they had spent Rs.100 to 200 per month. They preferred to consume 500 to 700 gms of quail meat at their home. Majority (56.65 per cent) of the respondents had no preference on specific occasions to consume quail products and almost all the respondents preferred to consume on sunday and wednesday. Main source of information on availability of quail products is through meat stall. Chicken and mutton was the most preferred meat followed by Japanese quail. Taste, nutritional , meat quality and availability of quail products were the highly influencing factors for consumption of quail products.

PHOTOMICROGRAPH AND TENDERNESS QUALITY CHARACTERISTICS OF CARABEEF COOKED IN WATER BATH

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A study on thermally induced qualitative changes that take place on cooking buffalo meat in water bath at different temperatures viz. 800 C, 900 C and 1000 C for different durations of time viz. 30 minutes, 45 minutes and 60 minutes at each temperature was carried out to assess its influence on tenderness of meat. The parameters like shear force value (SFV) by Warner Bratzler Shear force apparatus and taste panel scores by trained sensory panelists were assessed to evaluate the tenderness quality characteristic of cooked meat. The qualitative changes that take place on cooking meat at various temperatures were observed by staining sections of cooked meat by Massons Trichrome method. Loss of crimp structure of perimysium in cooked meat was observed. Loss of structural integrity of myofibrils due to progressive distortion of endomysium and perimysium was observed in meat cooked at higher temperatures. The qualitative picture indicated progressive denaturation changes in collagen fibres thereby leading to tenderness which is evidenced by decrease in shear force value and increase in taste panel score with increase in temperature and time of cooking meat in water bath.

A STUDY ON MUTTON/GOAT MEAT PRODUCTION IN CHENNAI CORPORATION SLAUGHTERHOUSE

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The number of sheep and goats slaughtered at the Corporation Slaughterhouse, Perambur, Chennai between the years 2001-2005 was studied with the objective of analyzing the production trend of mutton/goat meat, studying the relationship between season and production of mutton/goat meat, and studying the adequacy of infrastructure and Veterinary Inspection expertise for mutton production in Chennai city. The statistics of Chennai City Corporation was utilised for the study. There is a consecutive, but statistically insignificant dip in the number of sheep and goats slaughtered, barring the year 2003 which recorded the highest production (458126 heads) among the years considered for the study. Similarly no significant difference was observed in the number of animals slaughtered between the months. However, there was a significant seasonal variation and more sheep/goats were slaughtered in summer (March to August) than winter (September. to February). The summer vacation may be a reason for this as evidenced by the highest number of sheep/goats (41264 heads) being slaughtered in the month of May, or the perception among the public that mutton is capable of mitigating body heat that escalates during summer. The consistent drop in the number of sheep and goats slaughtered essentially implies a drop in the production of mutton/goat meat. This viewed in the light of constant increase in population of Chennai city is suggestive of either mutton/goat meat losing its pristine position as the meat of choice of the public of Chennai City or slaughter of sheep and goats taking place in locations apart from registered slaughterhouse(s) of Chennai city, probably owing to limitations of infrastructure in the registered slaughter houses. The latter is more likely as the cost of mutton/ goat meat is forever increasing which is suggestive of their continuing popularity. The study revealed the number of sheep and goats slaughtered on an average is approximately 1500 per day which warrants the services of four Veterinarians exclusively for the sheep/goat section to conduct a proper meat inspection.

A STUDY ON BEEF/BUFFALO MEAT PRODUCTION IN CHENNAI CORPORATION SLAUGHTERHOUSE

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The number of cattle and buffalo slaughtered at the Corporation Slaughterhouse, Perambur, Chennai between the years 2001-2005 was studied with the objective of analyzing the production trend of beef/buffalo meat, studying the relationship between season and production of beef/buffalo meat and studying the adequacy of infrastructure and Veterinary Inspection expertise for beef/buffalo meat production in Chennai city. The statistics of Chennai City Corporation was utilised for the study. There is a consecutive and significant dip in the number of cattle and buffalo slaughtered, barring the year 2003 which recorded the highest number of cattle/buffalo slaughtered (4456 heads) among the years studied. But there was no significant difference between the months in the number of cattle/buffalo slaughtered in the years considered for the study. However there was a significant seasonal variation and more cattle were slaughtered in summer (March to August) than winter (September to February). This trend might be attributed to the major festivals of Tamil Nadu being celebrated during winter, which might cause the slump in the demand for beef. The consistent drop in the number of cattle slaughtered implies a drop in the production of beef. This viewed in the light of constant increase in the population in Chennai City and the increasing acceptability of beef among the public, as evidenced from the consistent increase in the price of beef is suggestive of slaughter of cattle/buffalo taking place in locations apart from Corporation Slaughterhouse, Perambur, probably owing to limitations of infrastructure in the registered slaughter house. The study revealed the number of cattle slaughtered on an average is approximately 200/day which warrants the services of four Veterinarians exclusively for the cattle section to conduct a proper meat inspection.

KEEPING QUALITY AND ORGANOLEPTIC STUDIES OF BEEF FRY PRESERVED BY EMPLOYING GAMMA RADIATION.

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The study was conducted to preserve ready-to-eat beef fry employing gamma radiation at a dose of 2kGy under chiller condition (4⁰C). Prevention of Food Adulteration Act (PFA, 1998) permitted to preserve meat and meat products including chicken by irradiation using a dose of 2.5-4 kGy for destroying pathogens. Beef fry was prepared taking all precautions to suit Indian palate. The product was packed in high-density polyethylene (150∞) bags and heat sealed, excluding the air present inside. The product was irradiated using Gamma Chamber 5000 at a dose rate of 2 kGy. The product was kept at chiller condition (4⁰C) along with non irradiated sample as control. The product was analyzed with respect to physicochemical qualities like pH, Thiobarbituric acid reacting substance (TBARS) and Tyrosine Value (TV)., microbiological qualities with respect to Aerobic Plate Count (APC), Staphylococcal Count, Streptococcal Count, Count of E coli, Coliform, Yeast and Mould. The organoleptic evaluation with respect to colour, flavour, tenderness, juiciness and overall acceptability were assessed during the days of storage with the help of 9 point hedonic scale. The irradiated samples showed an enhanced shelf life of 28-32 days where as control sample spoiled organoleptically by 7-9 day of storage. There was 94-98 percent reduction with respect to APC, Staphylococcal Count and Yeast and Mould Count and the irradiated sample were free from (100 percent reduction) Coliform, E.coli and Streptococcal Count. The physicochemical characters have not revealed much variation between irradiated and non-radiated sample. The irradiated sample has shown a slight increase in TBARS value, within the acceptable level 1.54 ± 0.07 on 28th day of storage against 0.57 ± 0.04 in fresh sample. Organoleptic evaluation has not revealed any marked difference between irradiated and non-irradiated sample even after 28 days of storage at chiller temperature.

EFFECT OF POLYUNSATURATED FATTY ACID RICH OILSON QUALITY CHARACTERISTICS OF JAPANESE QUAIL MEAT AND EGGS.

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The biological experiments were conducted with day-old straight run Japanese quail chicks upto 26 weeks of age to study the effect of polyunsaturated fatty acid (PUFA) rich fish and linseed oil sources either independently and simultaneously at two and four per cent levels in feed either individually or in combination on quality characteristics of Japanese quail meat and eggs. The results revealed that the effect of PUFA rich oils at different levels had no significant difference in ready-to-cook yield and eviscerated yield due to treatment groups. Supplementation of PUFA rich fish and linseed oils at different levels either individually or in combination did not alter the organoleptic characteristics of meat. Further, egg quality characteristics such as egg weight, Shape Index, Albumen Index, Yolk Index and Internal Quality Unit Score, yolk colour and shell thickness were not significantly influenced by the incorporation of various n-3 PUFA rich oil sources in Japanese quail layer diets. Although sensory quality characteristics such as colour, texture, flavour and overall acceptability of eggs did not get altered significantly due to oil supplementation, eggs collected from the birds in 2 per cent fish oil group as well as combination of fish and linseed oils at 2 per cent levels recorded numerically higher overall acceptability scores over the eggs collected from the birds in other treated groups.

CRITICAL CONTROL POINTS IN HYGIENIC BROILER DRESSING

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Broiler meat marketing studies were conducted in shops in and around Gannavaram and Vijayawada. Basing on sale output and hygienic facilities for slaughter, they were classified into three categories viz.shops with better hygiene, shops with moderate hygiene and shops with low hygiene. Total viable counts (TVC) per sq.inch were analysed in the three types of shops on the surface of live and broiler carcasses (n = 10) at different stages of dressing to evolve Critical Points for Control under HACCP. Salmonella and Staphylococcus aureus were absent in the samples studied. Two types of dressing operations are practiced among the shops studied. For skin less dressed carcasses, no scalding and singeing was attempted. Skin along with feathers is removed after bleeding. Mean initial counts (TVC) in log CFU/ sq.inch of 6.07, 6.04 and 7.00 decreased to 2.30, 2.63 and 5.03 on skin less dressed carcasses in shops with better hygiene, medium hygiene and low hygiene respectively. It was observed that dressing stages viz. After singeing & washing, After evisceration & washing with skin on and After evisceration& washing& deskinning were found to be Critical Points for Control in shops with better hygiene and low hygiene, Where as the dressing stage After evisceration & washing &deskinning was found to be Critical Point for Control in shops with medium hygiene.

EFFECT OF DIFFERENT METHODS OF STUNNING ON THE BLEEDING EFFICENCY IN PIGS.

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The effect of different methods of stunning on the bleeding efficiency in pigs was assessed by subjecting twelve castrated male large white Yorkshire pigs of 50- 75 Kg of 6- 8 months age to stunning prior to slaughter by mechanical and electrical means. Six animals were stunned with convoy captive bolt pistol at 2.5 cm above the level of eyes and the rest of the animals were stunned with electrical stunner by passing 250mA, 75 volts electrical current for 7 seconds through the brain by placing the electrodes on either side of the head just below the base of the ears. Sticking was performed immediately after stunning by severing the anterior vena cava as the animal was in prone position. The efficiency of bleeding was assessed by weighing the amount of blood removed from the animal and the time of bleeding. The amount of blood removed was expressed in percentage as the ratio of weight of blood removed to the live weight of the animal. The time of bleeding was the time elapse (interval) from the first drop to the last drop of blood removed from the carcass. The results from this study revealed that the per cent blood removed from the carcass after electrical stunning was significantly higher (3.23 ± 0.31) than mechanical stunning by captive blot pistol (1.47 ± 0.17). The amount of blood removed was less than the expected maximum of 50% might be due to sticking the pigs in prone position. There was no significant difference in bleeding time among the stunning methods. It was concluded that electrical stunning by passing 250mA, 75 volts electrical current for 7 seconds through the brain and sticking the pigs immediately in hanging position for better bleeding.

EFFECT OF STUNNING ON THE BLEEDING EFFICENCY IN GOATS.

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The effect of stunning on the bleeding efficiency in goats was assessed by subjecting twelve female goats of 20- 30 Kg of 18- 24 months age. Six animals were stunned with small pole axe over the top the head just behind the ridge between the horns and the rest of the animals were slaughtered without stunning. Sticking was performed immediately after stunning by bilateral severing of both the carotid arteries and jugular veins. The efficiency of bleeding was assessed by weighing the amount of blood removed from the animal and the time of bleeding. The amount of blood removed was expressed in percentage as the ratio of weight of blood removed to the live weight of the animal. The time of bleeding was the time elapse (interval) from the first drop to the last drop of blood removed from the carcass. The results from this study revealed that the per cent blood removed from the carcass after stunning was significantly higher (4.51 ± 0.17) than with out stunning (2.89 ± 0.4). The amount of blood removed was less than the expected maximum of 50% might be due to sticking the animals in the ground. There was no significant difference in bleeding time among the stunned and with out stunned group. It was concluded that for better removal of blood from the goats, it was better to stun and stick the animals in the hanging position.

MEAT SCIENCE AND TECHNOLOGY RESOURCES ON THE INTERNET: PROSPECTS AND CHALLENGES

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Information is a dynamic and inexhaustible source that affects all disciplines and Meat Science is no exception. Information in Meat Science is used to support education, research and development, for the production of foods and services that touch all over lives. The role of Meat Science information depends on the level of user group served and there are researchers, teachers, entrepreneurs and even policy makers and planners who have to keep abreast of new developments in Meat Science and Technology all the time. In this context, the Internet plays a vital role in the dissemination of valuable information concerned with meat production, meat processing, quality control, packaging, preservation and marketing. The above said user group can use the Internet as a tool for communication, education and research. This paper attempts to explore various kinds of resources available in the cyberspace for those studying or working in the discipline of Meat science and Technology and how can they use them. Further, this paper attempts to give a basic collection of key Internet sites that can support study, teaching or research in the field of Meat Science and Technology. The Internet is a virtual library, consisting of an unlimited amount of information and an open medium where anyone can publish and access the information. Furthermore, the sites are created for a variety of purposes to inform, persuade, sell and change an attitude or belief and are not monitored, edited, regulated or approved. These factors remind us of the fact that information that has been published on the Web, is no indication of its believability or accuracy and it is important to differentiate between sites that are credible and those that are not which is a great challenge. Therefore, this paper discusses about the published criteria for evaluation of Internet resources viz., authority, accuracy, purpose, content, currency, design, organization and ease of use, as well.