J. Meat Sci. 2019, 14 (1&2): 16-19 Research paper

Preparation of Spent Hen Meat Pickle with Gooseberry Powder

S. Kumaresan, U.K. Pal*, P.K. Mandal and S. Kasthuri

Department of Livestock Products Technology
Rajiv Gandhi Institute of Veterinary Education and Research
Kurumbapet, Pondicherry – 605009

ABSTRACT

The present study was conducted to standardize the recipe for preparation of spent hen meat pickle using gooseberry powder with reduced levels of vegetable oil and acetic acid and to evaluate the effect of gooseberry powder on sensory quality of spent hen meat pickle. A pickle recipe was standardized containing 10% onion, ginger and garlic paste, 15% oil, 15% meat broth to produce acceptable quality spent hen meat pickle. To select suitable levels 1, 2 and 3% gooseberry powder (GBP) was incorporated along with 0.5% acetic acid. Based on the experimental results, it was observed that spent hen meat pickle containing 2 and 3% GBP had comparatively lower pH (4.34±0.1 to 4.48±0.1) and better overall acceptability scores (7.20±0.1 to 7.33±0.1) when compared to product containing 1% GBP.

Keywords: *Gooseberry, Pickle, Spent hen meat, Sensory quality*

Received: 8/4/2020 Accepted: 11/5/2020

INTRODUCTION

Perishability of meat is a serious problem in tropical countries like India. Pickling of perishable foods in vinegar or edible oil with edible salt, spices and condiments provides a ready-to-eat product stable at ambient temperature (Nayak et al., 2009). Spent hen meat could be effectively utilized to prepare value added ready-to-eat meat pickle with superior sensory quality, high nutritive value which remained safe for consumption up to 90th day of storage at ambient temperature (Das *et al.,* 2013). Gadekar *et al.* (2010) stated that the pickling of meat offers highly delicious and nutritious ready-to-eat shelf stable product with relatively better shelf life. Pickling of meat is an alternative method to develop a low cost shelf stable meat product for the market. Pickling also helps in improving desirable characteristics like taste, flavor and texture along with preservative effect. Acetic acid used in meat pickles also improves the meat texture making it more digestible. Relatively low water activity (aw) and low pH are the major barriers that contribute to shelf stability of pickled food (Gadekar *et al.,* 2010).

In the process of pickling, various organic acids are used to regulate the pH during storage at room temperature, but now-a-days their usage is being restricted owing to desire for products with natural preservatives. Consumer preferences for natural products have resulted in an increased interest in the use of natural acidulants especially from fruits like gooseberry juice (Emblica officinalis), lemon juice (Citrus limonium), and green mango (Mangifera indica) (Reddy *et al.,* 2013). Gooseberry is the richest source of antioxidants like vitamin C, (Bhattacharya *et al.,* 2000), polyphenol and flavonoids (Anilakumar et al., 2004). Gooseberry has also been reported to possess antifungal, antibacterial and antiviral activities (Rani and Khullar, 2004). Najeeb *et al.* (2014, 2016) reported preservative effects of gooseberry powder comparable to that of BHT to augment the shelf life of restructured chicken slices/blocks from ten days to twenty. Hence, the present study was conducted to standardize the recipe for preparation of spent hen meat pickle using different levels of gooseberry powder with reduced levels of vegetable oil and acetic acid and to evaluate the effect of gooseberry powder on sensory quality of spent hen meat pickle.

* Corresponding author E-mail address: paluttamkumar@gmail.com
DOI : 10.5958/2581-6616.2019.00004.5

MATERIALS AND METHODS

The whole study was divided in to two experiments as below:

Experiment–I: Standardization of the recipe and procedure to prepare spent hen meat pickle

This study was undertaken to standardize the recipe and procedure for preparation of spent hen meat pickle.

Spent hen meat: Culled Giriraja breeders (female parent stock) were procured from Instructional Livestock Farm Complex, Rajiv Gandhi Institute of Veterinary Education and Research (RIVER) and were slaughtered under hygienic condition in the semi-automatic poultry dressing unit in the Department of Livestock Products Technology, RIVER. All the carcasses were deboned manually and deboned breast and leg meat were stored in freezer at -18±1o C till further use.

Ingredients: Ingredients used in the recipe for preparation of spent hen meat pickle were obtained from the local market of Puducherry. Dry spice mix contained Cumin (16 parts), Coriander (16 parts), Black pepper (12 parts), Red chilli (10 parts), Kashmir chilli (20 parts), Turmeric powder (8 parts), Anise (6 parts), Clove (4 parts), Cinnamon (4 parts) and Cardamom (4 parts). Onion, ginger and garlic paste was prepared with 3:1:1 ration. Gingely oil (sesame oil) of reputed brand was used and Acetic acid of analytical grade (MERCK, Mumbai) was used.

Standardization of recipe: Based on the literature search, tentative recipe of spent hen meat pickle was selected which contained for 100g of deboned meat, salt -4g, sugar -1g, dry spice mix -5g, onion, ginger and garlic paste -10g, oil 30g and acetic acid -1ml. In the standardization process an attempt was made to reduce the oil content in the recipe of the pickle by replacing part of the oil with meat broth obtained during pressure cooking of the meat. After conducting several trials it was found that spent hen meat pickle containing 15g oil and 15ml meat broth with other remaining ingredients as stated above was suitable for producing acceptable quality spent hen meat pickle.

Procedure to prepare spent hen meat pickle: The frozen deboned meat was thawed by keeping in the refrigerator overnight. The thawed meat was cut into pieces of about 1.0 cm3 in size. Then it was marinated with 50% of the required amount of salt (20g)

and sugar (5g) for 20 minutes at room temperature. Then 100 ml water was added for 1000 g of meat and subjected to pressure cooking for 20 minutes. The cooked-out broth was separated from the chunks by straining and the volume was adjusted to 150 ml. Cooked chicken pieces were deep fried in the oil (150g) till it became golden brown colour and then removed from the oil and were kept aside. Then onion, ginger and garlic paste (100g) were fried in oil followed by dry spices mix (50g) and remaining 50% salt (20g) and sugar (5g) were added and mixed uniformly. After that cooked-out-broth (150ml) was added along with fried meat pieces and cooked for 2-3 minutes. It was allowed to cool at room temperature and then acetic acid (10ml) was added and mixed uniformly. After proper mixing, it was packed in Polyethylene terephthalate (PET) bottles and stored at room temperature. The pickle was allowed a maturation period of seven days before subjecting them to analysis. The pickle containing 1% acetic acid was taken as control in the next experiments.

EXPERIMENT-II: Selection of the suitable levels of gooseberry powder for spent hen meat pickle with reduced level of acetic acid

Preparation of gooseberry powder: The gooseberry fruits were collected from the local market of Puducherry. Fruits were washed in potable water 3 - 4 times, air dried and sliced to small pieces and ground in home mixer and were kept in hot air oven at the temperature of 500C for about 10 - 12 hours for proper drying. Then the dried powder was ground once again in home mixer grinder and packed in food grade plastic container and kept in refrigerator for further use.

Selection of suitable levels of gooseberry powder for spent hen meat pickle: Three trials were conducted separately to select suitable levels of gooseberry powder along with 0.5% acetic acid. In the pickle recipes, 1, 2 and 3% gooseberry powder was incorporated along with 0.5% acetic acid. Thus the samples for control (1% acetic acid); T1 (0.5% acetic acid+1% gooseberry powder); T2 (0.5% acetic acid +2% gooseberry powder) and T3 (0.5% acetic acid +3% gooseberry powder) were prepared.

pH: The pH of spent hen meat pickle was determined by adopting the procedure laid down by AOAC (1995). For measuring the pH 5g of the spent hen meat pickle was homogenized with 45ml of distilled water in a mortar with pestle. The pH of the homogenate was recorded by immersing the combined glass electrode of the pH meter (DELUXE pH meter 101).

Sensory evaluation: A semi-trained panel consisting of faculty and postgraduate students of RIVER was used for the sensory evaluation of the product. The panelists were explained about the nature of experiment without disclosing the identity of the samples. They were requested to record their preferences on an 8-point hedonic scale (8= like extremely, 1= dislike extremely) for appearance, flavour, texture, saltiness, sourness and overall acceptability. Sensory panel was conducted either at 11 am or at 4 pm every time. Plain water was provided to each panelist to rinse the mouth in between the samples.

Statistical analysis: Each experiment was replicated thrice. One-way analysis of variance (ANOVA) was used for pH and scores on sensory attributes. The significant effects were tested by comparing mean values using the least significant difference (LSD) test at 1 and 5% level (Snedecor and Cochran, 1994).

RESULTS AND DISCUSSION

Experiment-I: Standardization of the recipe and procedure to prepare spent hen meat pickle

Tentative recipe of spent hen meat pickle containing deboned meat-100g, salt-4g, sugar-1g, dry spice mix - 5g, onion, ginger and garlic (3:1:1) paste -10g, oil (gingelly/sesame) -30g and acetic acid -1ml was selected for standardization with an aim to reduce the level of oil in the recipe. After experimentation, it was found that an acceptable quality spent hen meat pickle can be prepared by replacing 50% of oil (15g) with 15 ml meat broth which was obtained during pressure cooking of spent hen meat. Thus, the final standardized recipe of spent hen meat pickle contained deboned meat-100g, salt-4g, sugar-1g, dry spice mix-5g, onion, ginger and garlic paste-10g, oil-15g, meat broth-15ml and acetic acid-1ml. However, Jayanthi et al. (2008) reported the use of 40% vegetable oil in the traditional type spent hen meat pickle. Das et al. (2013) used 36.5% onion, ginger and garlic paste in spent chicken meat pickle recipe whereas Grover et al. (2004) used 3% garlic and 30% oil in the recipe of tenderized chicken gizzard pickle. Further, Pal et al. (1996) reported to incorporate 20% onion, ginger and garlic paste, 12% vegetable oil and 40% meat broth in the recipe of acceptable quality pork pickle.

Table 1: Standardized recipe of the spent hen meat pickle

Ingredients	Quantity (g)
Meat	100
Salt	4
Sugar	1
Dry spices	5
Onion, ginger, garlic paste	10
Oil	15
Meat broth	15ml
Acetic acid	1 ml

In the present study, standardized recipe containing 10% onion, ginger and garlic paste, 15% oil, 15% meat broth besides other ingredients were found to produce acceptable quality spent hen meat pickle. This standardized recipe was used as control in all subsequent experiments (Table 1).

Experiment–II: Selection of suitable levels of gooseberry powder in meat pickle with reduced level of acetic acid

In preliminary trials, 5 and 10% gooseberry juice were used in the recipe as acidifier but spent hen meat pickle had shelf life of only 10 days. Incorporation of gooseberry powder at the level of 5 and 10% in the spent hen meat pickle resulted in unacceptable product in terms of extreme sourness and reduced overall acceptability. Finally, 1, 2 and 3% gooseberry powder were used and found to be acceptable.

Nutrient composition of the basal diet was more or less similar to the calculated values both during pre-starter, starter and finisher phases with regard to crude protein, ether extract, crude fiber, total ash and nitrogen free extractives on per-cent dry matter

Table 2: Effect of different levels of gooseberry powder (GBP) on the pH of spent hen meat pickle (Mean ± SE)

Products	Control	1% GBP	2% GBP	3% GBP
Trial I	4.30±0.01	4.62±0.01	4.40±0.01	4.34±0.01
Trial II	4.30±0.01	4.60±0.01	4.48±0.01	4.34±0.01
Trial III	4.28±0.01	4.60±0.01	4.48±0.01	4.35±0.01
Overall mean	4.29±0.01a	4.61±0.01d	4.45±0.01c	4.34±0.01[b]

Means with different superscripts in a row (lower case letters) differ significantly (P<0.05)

basis. With regard to the mycotoxin content, the basal diet was naturally contaminated with minimum 50 ppb of aflatoxin and maximum of 500 ppb.

As stated above, gooseberry powder (GBP) was added at the levels of 1, 2 and 3% in standardized recipe of spent hen meat pickle. The pH of spent hen pickle containing 1, 2 and 3% gooseberry powder along with 0.5% acetic acid and the control sample containing 1% acetic acid were measured after 7 days of maturation period (table 2). Significant (P<0.05) differences in overall mean pH values were observed between the products after 7 days of maturation period. The overall mean pH of the products was in the following increasing order: Control (4.29±0.01) followed by 3% GBP (4.34±0.01), 2% GBP (4.45±0.01) and 1% GBP (4.61±0.01) containing products. Similar to this observation, Maiti et al. (2009) reported that gizzard pickle treated with ginger and kachri had lower pH (4.30±0.06) than control sample (4.56±0.04) in their study. Bariya et al. (2016) reported that 10 % gooseberry fruit extract incorporated patties showed lowest value for pH as compared to the control and gooseberry seed coat extract incorporated patties.

The appearance scores of the spent hen meat pickle containing different levels of GBP were not affected significantly and scores remained above 7 on 8 point hedonic scale indicating that all the products were well acceptable (table 3). Sensory scores for appearance were numerically higher for 1% GBP treated samples followed by 3% GBP, control and 2% GBP treated samples. No significant differences were observed among control and 1, 2 and 3% GBP containing spent hen meat pickles due to almost similar appearance of all the products. Similar to present observations, Wani and Majeed (2014) reported non-significant difference in appearance scores of fried gizzard pickles. Das et al. (2013) also reported that no significant differences were observed in the appearance (colour) scores of spent hen meat pickle. Singh et al. (2011) reported a colour and appearance score of 7.19 on 8- point hedonic scale for bone-in spent quail meat pickle containing 2.5% amla juice in the formulation.

Sensory scores for flavour ranged between 7.07±0.14 to 7.27±0.14 wherein highest scores were recorded for 1% GBP (7.27±0.14) and lowest for control (7.07±0.14) indicating very good flavour but there were no significant differences among the treatments and control (table 3). Vrinda (2008) reported a flavour of 7.83±0.2 on 9- point hedonic scale, whereas, Jayanthi et al. (2008) reported a flavour score of 6.90±0.15 on 8- point hedonic scale for spent hen meat pickle containing acetic acid or vinegar as acidifier which are almost similar to the findings of the present study. Singh et al. (2011) recorded a flavour score of 6.83 on 8 point hedonic scale for bone-in spent quail meat pickle prepared by using 2.5% amla juice as acidifier. Texture scores ranged between 6.89±0.19 to 7.10±0.15 with no significant differences among the treatments and control (table 3). Singh et al. (2011) reported that gooseberry juice added spent quail meat pickle had a texture score of 7.19 on 8 point hedonic scale after 7 days of maturation period. Vrinda (2008) and Jayanthi et al. (2008) also reported almost similar texture scores for spent hen meat pickles containing vinegar or acetic acid in the recipes. Sensory scores for saltiness varied from 6.93±0.17 to 7.20±0.14 wherein the highest score was recorded for 2% GBP (7.20±0.14) and lowest for 1% GBP containing product (6.93±0.17) indicating very good scores for saltiness. But no significant differences were observed among the treatments and control (table 3). Almost similar saltiness scores of 7.07 on 8-point hedonic scale were reported by Singh et al. (2011) in spent quail meat pickle and Jayanthi et al. (2008) spent hen meat pickle.

Table 3: Effect of different levels of gooseberry powder (GBP) on the sensory attributes of spent hen meat pickle (Mean ± SE)

Parameters	Control	1% GBP	2% GBP	3% GBP
Appearance	7.33±0.14	7.40±0.11	7.27±0.14	7.37±0.12
Flavour	7.07±0.14	7.27±0.14	7.20±0.14	7.20±0.16
Texture	7.07±0.14	6.93±0.15	7.10±0.15	6.89±0.19
Saltiness	7.10±0.10	6.93±0.17	7.20±0.14	7.10±0.13
Sourness	7.10±0.12	6.93±0.14	6.87±0.16	6.97±0.17
Overall acceptability	7.30±0.10	7.03±0.13	7.33±0.14	7.20±0.10

Sourness scores which ranged from 6.87±0.16 to 7.10±0.12 did not show any significant differences among the treatments and control samples (table 3). Singh et al. (2011) reported almost similar sourness scores of 6.91 on 8- point hedonic scale for gooseberry juice added spent quail meat pickle. However, Jayanthi et al. (2008) recorded comparatively lower sourness score (6.48±0.12) on 8 point hedonic scale in spent hen meat pickle containing 20% vinegar as acidifier.

Overall acceptability scores were found in the range of 7.03±0.13 to 7.33±0.14 for all the products. The highest score of 7.33±0.14 was recorded for the product containing 3% GBP, whereas, the lowest score of 7.03±0.13 was recorded for 1% GBP containing products. But no significant differences were found among the treatments and control (table 3). Singh et al. (2011) reported that gooseberry juice added spent quail meat pickle with overall acceptability score of 6.98 which was slightly lower than the scores recorded in the present study. For spent hen meat pickle containing acetic acid or vinegar, the overall acceptability score was reported to be 7.91±0.12 on 8 point hedonic scale (Vrinda, 2008) and 6.82±0.24 on 7- point hedonic scale (Jayanthi et al., 2008). Based on present set of experiments and results, it can be concluded that spent hen meat pickles containing 2 and 3% GBP had comparatively lower pH (4.34±0.1 to 4.48±0.1) and better overall acceptability scores (7.20±0.1 to 7.33±0.1) when compared to product containing 1% GBP

ACKNOWLEDGEMENT: The authors are grateful to the Dean, Rajiv Gandhi Institute of Veterinary Education and Research, Pondicherry for providing facilities for the conduct of the research work.

COMPETING INTERESTS: The authors have no known competing interests.

ETHICS STATEMENT: Not Applicable

REFERENCES

Anilakumar KR; Nagaraj NS and Santhanam K (2004). Protective effect of amla (Embilica officinalis) on oxidative stress and toxicity in rats challenged with dimethyl hydrazine. Nutr. Res. 24: 313 - 319.

AOAC (1995). Official Methods of Analysis, 16th edition Association of Official Analytical Chemists, Wahsington, DC.

Bariya AR; Chavada PJ; Nalwaya SB; Prajapati BI and Roy SK (2016). Shelf life assessment of cooked goat meat patties incorporated with amla fruit and alma seed coat extract at refrigerated storage (4±1°c). Int. J. Agric. Sci. 8 (52): 2560-2565.

Bhattacharya A; Ghosal S and Bhattacharya SK (2000). Antioxidant activity of tannoids principles of Emblica officinalis (amla) in chronic stress induced changes in rat brain. Ind. J. Exp. Biol. 38: 877-880.

Das A; Ranjan ND; Hazarika M and Laskar KS (2013). Studies on certain quality attribute of meat pickle prepared from spent chicken. Vet. World. 6 (3): 156- 158.

Gadekar YP; Kokane RD; Suradkar US; Thomas R; Das AK; Anjaneyulu ASR (2010). Shelf stable meat Pickles- a review. J Int Food Res 17: 221-227.

Grover RK; Sharma DP and Ahlawat SS (2004). Shelf life of oil and vinegar based chicken gizzard pickle. J. Meat Sci. 2: 30-34.

Jayanthi D; Karthik P; Kulkarni VV; Arthanari M; Kanagaraju P and Chandirasekaran (2008). Development of traditional styled meat pickle from spent hen meat. J. Meat Sci. 5 (1): 11- 14.

Maiti AK; Ahlawat SS and Khanna N (2009). Studies on development of tenderized chicken gizzard and goat heart pickles. Ind. J. Anim. Res. 43(4): 225-258.

Najeeb AP, Mandal PK and Pal UK (2014). Efficacy of fruits (red grapes, gooseberry and tomato) powder as natural preservatives in restructured chicken slices. Int. Food Res. J. 21(6): 2431-2436.

Najeeb AP, Mandal PK and Pal UK (2015). Efficacy of gooseberry, tomato and red grapes powder as preservatives in restructured chicken block. J. Meat Sci. 10(2): 21-25.

Nayak NK; PK Singh and Nanavati S (2009). Quality characteristics of matured chicken pickle. Ind. Vet. J. 88: 54-56.

Pal UK, Bachhil VN and Padda GS (1996). Recipe standardization for preparation of pork pickle. J. Dair. Food & Home Sci. 15(4): 219-225.

Rani P and Khullar N (2004). Antimicrobial evaluation of some medicinal plants for their anti-enteric potential against multidrug resistant Salmonella typhimurium. Phytochem. Res. 18: 670–673.

Reddy GVB; Sen AR; Nair PN; Reddy KK; Kondaiah N (2013). Effect of grape seed extract on the oxidative and microbial stability of restructured mutton slices. J. Meat Sci. 95 (2): 288-294.

Singh HO; Singh VP and Singh HN (2011). Compatibility assessment of various preservatives for quail meat (bone-in) pickle. Int. J. Agro. Vet. Med. Sci. 5(3): 290-297.

Snedecor GW and Cochran WG (1994). Statistical methods 6th edition Oxford and IBH publishing Co. New Delhi.

Vrinda S (2008). Application of starter culture for production of shelf stable pickles from spent hen. J. Dair. Foods and Home Sci. 27 (3): 157 – 167.

Wani SA and Majeed D (2014) Evaluation of quality attributes and storage stability of pickle prepared from chicken gizzard. J. Meat Sci. Technol. 2(4): 85-89.