# PASTURE FINISHING OF RABBITS USING THE MORANT STYLE HUTCH

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## ABSTRACT

Two trials were carried out using the Morant style hutch to evaluate the effect of outdoor finishing of rabbits on meat quality. Rabbits reared in conventional cages were used as controls in both trials. In the first trial, the rabbits were placed in pens on pasture at 33.8±0.21 days of age and were harvested at 72.8±0.21 days of age. The pen reared rabbits grew more slowly than those in cages resulting in lower (P<0.01) rates of gain, lighter (P<0.01) carcasses, and lower (P<0.05) dressing percentages (21.7±1.65 vs. 36.2±2.71 g/d; 946±80.7 vs. 1356±58.9 g; and 53.2± vs. 59.9±1.5%, respectively). There were no differences in the colors of the biceps femoris, external oblique, and trapezius muscles measured by reflectance spectrophotometer except for the trapezius in the pastured animals with higher (P<0.05) a* (redness) and b* (yellowness) values (9.36±1.03 and 8.78±0.61 vs. 6.51±0.76 and 7.01±0.45, respectively). Due to high mortality in trial 1, the rabbits in trial 2 were not placed on pasture until 44.5±0.21 days of age and were harvested at 58.5±0.21 days of age. There were no effects of housing on productivity traits or mortality. The b* value for the external oblique muscle from the caged rabbits was 8.64±0.33 while that from the penned rabbits was 7.56±0.33 (P<0.05), but there were no differences in L* (lightness) or a*. There were no differences in shear force needed to cut across 13-mm cores from muscles of the right rear leg with a Warner Bratzler blade (TA.XT.Plus Texture Analyzer, Texture Technologies, Scarsdale, NY). Consumer acceptance was measured on loin and left hind leg samples for tenderness, juiciness, flavor and overall acceptability on a 9-point hedonic scale by 17 to 21 faculty, staff and student evaluators. The only difference was a higher (P<0.05) tenderness score for the caged (6.9±0.11) than for the penned rabbits (6.6±1.1).

**Keywords:** Rabbit, Morant hutch, pasture, grass finishing

## INTRODUCTION

Pasture rearing of poultry has proven to be a profitable enterprise as well as providing a good environment for the birds and a healthful product for the consumer (Salatin, 1993). Earlier limited work with finishing rabbit fryers on pasture was successful and indicated this production method could have the same positive benefits for producers, the rabbits

and the consumers as those obtainable with pastured poultry (McNitt et al. 2003). Added benefits of pasture rearing of poultry and rabbits are the possible changes in the omega 3 fatty acids and conjugated linoleic acid (CLA) in the meat since increased omega 3 fatty acids and conjugated linoleic acid have potential positive effects on health (Robinson, 2004). McNitt et al. (2003) reported that rearing and finishing rabbits in movable pens on pasture provided reasonable growth rates. Pastured production can be profitable if the meat is sold to consumers who are willing to pay the extra cost of a pasture reared product (DeLazzer and Finzi, 1992).

Pasture rearing of rabbits is, in some ways, more difficult than chickens. In the first place, the rabbits do not "go to roost" in the evening as birds do. In fact, that is the time in the wild when they come out to eat (Lockley, 1954). As a result, it is difficult to use systems in which they are shut in a building at night. Their burrowing habit also makes confinement more difficult than for chickens.

Pasture housing for rabbits should confine the rabbits and protect them from predators and the environment. The housing should be easily movable and have a protected area for provision of feed and water. G.F. Morant (1883; cited by Sanford, 1992) described a movable ark that could be used for finishing fryer rabbits. The unit had a wire mesh floor with a wooden roof and sides. Preliminary studies in our unit indicate that a modification of the Morant style ark could provide a workable system for pasturing rabbits and merits further study (J. Milton, Jr., 2004, unpublished data).

The current studies were to further develop the Morant style hutch for outdoor finishing of rabbits and to evaluate the effect of finishing outdoors on the quality of the meat. High mortality of the pastured rabbits in the first trial resulted in a second trial with older rabbits to avoid these losses.

## MATERIAL AND METHODS

New Zealand White rabbits born at the Southern University Rabbit Research Unit were used in all the trials. Rabbits finished outdoors were housed in Morant style hutches as shown in Figure 1. Three hutch units, each measuring 244 x 91 x 91 cm (LWH), were used. The sides and ends were constructed of 2.5 x 5 cm, 14 ga. welded wire and the floor was 10 x 5 cm, 14 ga. welded wire. Approximately 1/3 of the length was covered by a sheet metal roof. A canvas flap was affixed to one end of the unit to cover the "J" feeder and protect the feed from rain. All three units were enclosed in an area surrounded by electrified netting to protect the rabbits from predation by dogs. The pens were moved one width onto clean grass each morning. In addition to the grazing available, the rabbits were given a commercial alfalfa-based pelleted ration containing 18% CP, 2.5% fat, and 18% CF free choice. Water was continuously available from automatic valves fed from a bucket resting on top of the hutch.

The caged rabbits were housed in three, single-deck 76 x 76 x 38 cm (LWH) quonset style wire cages suspended inside a building with opened side panels that provided protection from rain and sun. Fans and a tube distribution system were used for air circulation when ambient temperature exceeded about 23°C. A light-dark cycle of 16L: 8D was maintained with an automatic timer. The caged rabbits were fed the same

commercial, alfalfa-based pelleted ration as the pastured rabbits. Water was continuously available from automatic valves.

Figure 1. Morant style hutch used as a method for pasture finishing rabbits.

In Trial 1, the rabbits were randomly assigned to the treatments and placed in the units at 33.8±0.21 days of age. During the trial, concentrate usage and mortality were recorded. The fryers were harvested at 72.8±0.21 days of age and the carcasses chilled in a water bath for 24 hours. At that time, color measurements (L*(lightness), a*(yellowness) and b*(redness)) of the biceps femoris, external oblique and trapezius muscles were made with a handheld Minolta CM-2500c spectrophotometer (Konica-Minolta Sensing, Inc., Osaka, Japan). The carcasses were then vacuum packed and stored at - 40°C.

In trial 2, the rabbits were randomly assigned to the treatments and housed at 44.5±0.21 days of age and harvested at 58.5±0.21 days of age. During the growth period, concentrate usage and mortality were recorded. The feed intake and feed:gain ratios were calculated on a per pen basis. After harvest, the carcasses were chilled for 24 hours in a water bath. After that time, color measurements (L*, a* and b*) of the biceps femoris, external oblique and trapezius muscles were made with a hand held Minolta CM-2500c spectrophotometer (Konica-Minolta Sensing, Inc., Osaka, Japan). The right rear leg was then separated from the remainder of the carcass. Both portions of the carcasses were separately vacuum packed and stored at -40°C for 30 to 60 days until the tenderness and consumer acceptability trials were carried out.

Tenderness evaluations were carried out using the muscles of the right rear leg. The legs were thawed, sealed in foil packets and placed in an oven preheated to 135°C for 60 minutes or until an internal temperature of 71°C was reached in the thickest part of the muscle. The samples were then removed from the oven, allowed to cool at room temperature for 10 minutes and stored overnight in a refrigerator at 3°C. The following day, a 13 mm core was taken from the thickest part of the muscle by inserting the corer parallel with the grain of the muscle fibers. The force needed to cut across each core was measured three times (TA.XT.Plus Texture Analyzer, Texture Technologies, Scarsdale, NY) with a Warner Bratzler blade.

A consumer acceptance trial was carried out on the remainder of the carcasses according to the testing procedures of AMSA (1995). The meat was baked without spices at 149ºC for 105 minutes or until an internal temperature of 80 ºC
was reached. Cubes measuring 1.5-2.0 cm were taken from the loin and hind leg. Each sample was evaluated for tenderness, juiciness, flavor and overall acceptability on a 9-point hedonic scale (1=lowest, 9=highest) by 17 to 21 faculty, staff and student evaluators. Tasters were instructed to taste each sample, provide the rating and then cleanse the palate with apple juice before evaluating the next sample.

Data were analyzed using the SAS General Linear Models Procedure (SAS, 1999) with housing treatment (caged or penned) as the independent variable.

## RESULTS AND DISCUSSION

In trial 1, the mortality of the pen reared rabbits was 50% while there were no deaths among the caged rabbits. This high mortality may have been a result of placing the rabbits in the pens immediately after weaning at four weeks of age leading to digestive problems. The production data shown in Table 1 indicate that the pen reared rabbits grew more slowly than those in cages resulting in lighter carcasses ($P<0.01$). The dressing percentages were also lower for the pastured rabbits ($P<0.05$). Because of the high mortality, feed intakes and efficiencies were not calculated. There were no differences in the colors of the muscles except the trapezius in the pastured animals had higher ($P<0.05$) a* and b* values than the cage reared animals.

**Table 1. Results of the first pasturing trial using the Morant style hutches (means ± s.e.)**

| Variable | | Cage housed | Pastured |
|---|---|---|---|
| Number of rabbits at the start | | 15 | 16 |
| Number of rabbits at the end | | 15 | 8 |
| Rate of gain (g/d) | | 36.2±2.71$^{a}$ | 21.7±1.65$^{b}$ |
| Final live weight (g) | | 2272±88.1$^{a}$ | 1728±120.6$^{b}$ |
| Cold carcass weight (g) | | 1356±58.9$^{a}$ | 946±80.7$^{b}$ |
| Dressing percentage | | 59.9±1.5$^{A}$ | 53.2±2.05$^{B}$ |
| Biceps femoris | L* | 65.3±0.92 | 68.3±1.26 |
| | a* | 2.52±0.44 | 3.41±0.60 |
| | b* | 5.03±0.53 | 5.88±0.73 |
| External oblique | L* | 65.8±0.82 | 64.0±1.12 |
| | a* | 3.94±0.45 | 3.71±0.62 |
| | b* | 5.57±0.63 | 4.84±0.86 |
| Trapezius | L* | 66.7±0.79 | 64.5±1.08 |
| | a* | 6.51±0.76$^{B}$ | 9.36±1.03$^{A}$ |
| | b* | 7.01±0.45$^{B}$ | 8.78±0.61$^{A}$ |

$^{a,b}$ Means in the same row with unlike superscripts differ ($P<0.01$)
$^{A,B}$ Means in the same row with unlike superscripts differ ($P<0.05$)

In trial 2, which started with older animals, there were no differences in mortality nor any of the production traits (Table 2). The b* value was higher (P<0.05) for the external oblique muscle from the cage reared rabbits. The shear forces for muscles from the two housing treatments were not different. The consumer acceptability scores of the rabbit meat showed much variation, but the only discernable treatment effect was for tenderness (P<0.05). The short time of pasturing did not give the expected differences in flavor, juiciness, and acceptability of the meat to balance the added labor and production expenses compared with caged rabbits.

**Table 2. Results of the second pasturing trial using the Morant style hutches (means ± s.e.)**

| Variable | | Cage housed | Pastured |
|---|---|---|---|
| Number of rabbits at the start | | 17 | 17 |
| Feed intake/rabbit/day (g) | | 152.0 | 160.0 |
| Feed/gain ratio | | 3.99 | 3.86 |
| Rate of gain (g/d) | | 38.5±2.18 | 35.6±2.18 |
| Final live weight (g) | | 2011±47.7 | 1928±47.7 |
| Cold carcass weight (g) | | 1097±28.8 | 1071±28.8 |
| Dressing percentage | | 54.4±0.004 | 55.6±0.004 |
| Biceps femoris | L* | 66.1±0.87 | 66.0±1.26 |
| | a* | 3.19±0.36 | 3.24±0.36 |
| | b* | 5.66±0.40 | 5.66±0.40 |
| External oblique | L* | 65.5±0.62 | 65.5±0.62 |
| | a* | 6.52±0.42 | 6.35±0.42 |
| | b* | 8.64±0.33$^{A}$ | 7.56±0.33$^{B}$ |
| Trapezius | L* | 64.0±0.74 | 64.3±0.74 |
| | a* | 9.6±0.68 | 10.5±0.68 |
| | b* | 9.6±0.68 | 9.3±0.68 |
| Shear force | | 1631±105.9 | 1827±105.9 |
| Tenderness | | 6.9±0.11$^{A}$ | 6.6±0.11$^{B}$ |
| Juiciness | | 6.0±0.11 | 5.7±0.11 |
| Flavor | | 6.3±0.10 | 6.1±0.11 |
| Overall acceptability | | 6.5±0.11 | 6.3±0.11 |

$^{A,B}$ Means in the same row with unlike superscripts differ (P<0.05)

## CONCLUSIONS

The Morant style hutch has potential for pasture finishing of rabbits although the changes in flavor and tenderness expected from a pastured product were not observed. The short 14 day finishing period in the second trial apparently was insufficient to produce measurable differences in the productivity of the rabbits or the meat quality. On the other hand, placing the rabbits in the pens immediately after weaning at four weeks of age may have caused digestive problems thus resulting in high mortality. Other trials are being conducted to determine the optimum pasturing time to obtain measurable changes.

Other studies to be conducted include analyses of the fatty acid profiles of the pastured rabbits and determination of the levels of conjugated linoleic acid resulting from pasturing these monogastric herbivores.

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