

GROWTH OF FRYERS REARED AND(OR) FINISHED USING CONTROLLED GRAZING IN MOVABLE PENS

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ABSTRACT: The productivity of fryer rabbits kindled in conventional hanging wire cages in a building and finished in a pasture pen (InOut), kindled and reared in a pasture pen (OutOut) or kindled and reared in the cages (OutOut) was compared to determine the feasibility of pasturing as a means of production. The pens were divided into four 120 x 120 cm compartments and placed on an established 80% orchard grass: 20% alfalfa-clover sward overlaid with chicken wire. The pens were moved to a new location each day for fresh grazing. Litters from eight does that kindled in cages and four that kindled in outdoor pens were used. At 42 days the fryers were weaned and 24 fryers born in the indoor cages were randomly assigned to cages within the barn (InIn) and 24 to outside pens (InOut). Thirty two of the fryers born in outdoor pens were randomly assigned to one of four outdoor pens (OutOut). The kits were weighed on days 42 (weaning), 55, 82 and 104. At day 104 the rabbits were processed and carcass and kidney fat weights recorded. Because of mortality, there were 23 InIn carcasses, 21 InOut carcasses and 30 OutOut carcasses. Data were analyzed using the General Linear Models Procedure of SAS. InIn fryers had higher ($P<0.01$) growth rates, final weights, carcass weights and kidney fat weights than the InOut or OutOut fryers (28.0±0.6 g/d, 2640±47 g, 1385±29 g and 15.4±1.0 g for InIn vs. 23.4±0.6 g/d, 2307±49 g, 1187±30 g and 6.4±1.0 g for InOut and 22.7±0.5 g/d, 2156±41 g, 1096±25 g and 0.9±0.9 g for OutOut, respectively). The InOut rabbits were numerically intermediate between the InIn and OutOut groups for all traits. Rearing and finishing rabbits in movable pens on pasture can result in reasonable rates of production which might be helpful in satisfying the demands of consumers who are willing to pay extra for the more naturally produced, grass-finished product.

Key words: rabbits, pasture, grass finishing, housing

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INTRODUCTION

Wild rabbits derive their nutrients from grazing and browse and, when rabbits were first exploited for human consumption and sport, they were reared in large, fenced or walled areas called *leporaria* or warrens. The rabbits in these enclosures were allowed to roam with little control of grazing or breeding and were harvested by ferreting, nets or snares (LEBAS *et al.* 1986; SANFORD, 1992). BRADLEY and HAGUE (1996) housed 12 does and their offspring in 200 m² fenced fields. This area was found to be insufficient for that number of rabbits and the groups had to be moved weekly. In a later study, the groups were reduced to eight does and the area doubled to 400 m². This resulted in fewer deaths due to population pressure. Challenges with this sort of system may involve overgrazing, air borne and surface based predators, disease control, difficulty of treating individual animals, capturing and harvesting fryers, controlling matings and burrowing leading to escapes (FINZI and AMICI, 1988; BRADLEY and HAGUE, 1996).

Confining rabbits in small groups in movable pens may alleviate some or all of these problems. G.F. Morant (1883; cited from SANFORD, 1992) described a movable ark with a wire mesh floor that could be moved regularly across a pasture to allow the rabbits to graze. This could be used for a finishing pen or for breeding stock and provides a solution to many of the problems noted with the warren. This came to be known as the Morant hutch. In the 1920's, there was a failed attempt in Russia to use the Morant hutch system as a means of providing meat for the populace (SANFORD, 1992). References to the Morant hutch can be found today on the world wide web although most refer to rearing covies rather than rabbits.

In the USA, rearing poultry on pasture in movable pens ranging from 2.4 x 2.4 m to 3.0 x 3.6 m has proven, in recent years, to be a profitable enterprise as well as providing a good environment for the birds, and a healthful product for the consumer (SALATIN, 1993). These birds are processed on the farm and sold directly to the consumer at prices much higher than poultry sold through commercial channels. Finishing rabbit fryers on pasture in similar pens, processing on farm and marketing

directly to the consumer could have similar positive benefits for the producer, the rabbits and the consumers.

DI LAZZER and FINZI (1992) described a system used on a small farm in Italy to produce "ecological" rabbits that were sold for nearly twice the price of conventionally reared rabbits. In this system, the does were housed in units that were a combination of all wire cages and cells built into the ground. At weaning, the fryers were placed in movable grazing cages measuring 1.5 x 0.98 m that were moved every two days. For the first 21 days of the finishing period, eight fryers were placed in each cage. The number was reduced to five for the subsequent 56 days. The fryers were provided water, commercial pelleted rabbit feed and alfalfa hay. It was concluded that despite the extra labor involved, the higher price received for the rabbits justified this method of production.

A pilot study carried out in 2001 in the USA indicated that fryers born and reared in cages reached a target slaughter weight of 2.25 kg in about 82 days whereas fryers born in cages and finished on pasture or born and reared on pasture required about 105 days to finish with feed: gain ratios of 3.3 ± 0.1 , 4.1 ± 0.2 and 3.1 ± 0.2 , respectively (WAY *et al.* 2002). Unfortunately, the design included doe, litter, and treatment confounding that obviated valid statistical comparisons among the treatments.

The present study was carried out to compare productivity of growing rabbits kindled in cages in a building and finished on pasture with those born in pasture pens and reared on pasture from kindling to processing.

MATERIALS AND METHODS

A trial was carried out in northeastern Maryland, USA in the summer of 2002 using four does housed in outdoor, movable pens (Figure 1) and eight housed in conventional, single deck, suspended, 91 x 76 x 46 cm (LWH), all wire cages inside

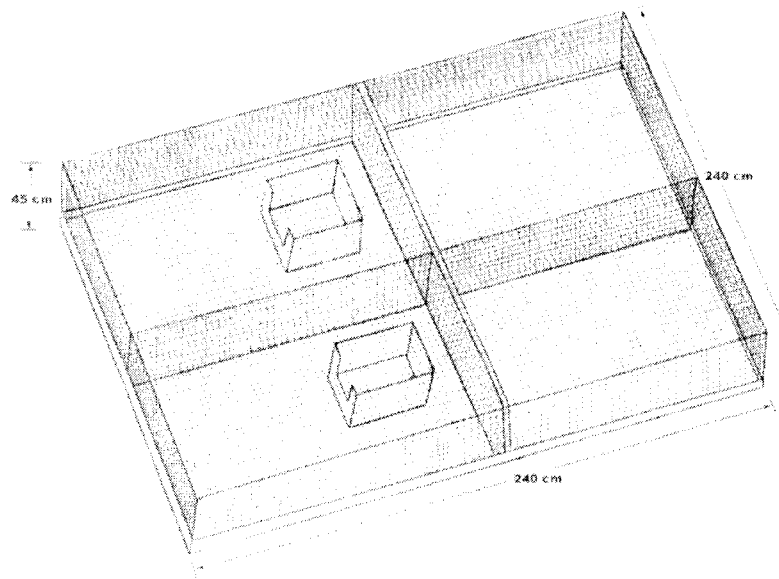


Figure 1: Three dimensional view of the pastured rabbit pen with doe cages on the left (with nest boxes) and fryer cages on the right.

a building with a fan for air distribution. During this period, the average exterior temperature ranged from 9°C in April to 27 °C in July. Before the trial, all the does (10 New Zealand White, 2 Californian crossbred) were housed in cages. They were randomly bred to a New Zealand White or a New Zealand White X Californian crossbred buck on March 15, 2002. On April 1 the pregnant does that had been randomly selected to be on pasture were moved to 120 x 120 x 46 cm (LWH) floorless pens on an established sward (80% orchard grass: 20% alfalfa-clover) overlaid with chicken wire with 50 mm openings to prevent the rabbits from digging out. The wire had been placed on the pasture early in the season to enable the grass to grow through. The pens were moved daily to provide fresh grazing. Both groups were fed the same pelleted commercial feed containing 16% crude protein, 2.5% crude fat and 16% crude fiber (Manna Pro-Double Duty Complete Rabbit Feed, Manna Pro Corporation, 707 Spirit 40 Park Drive, St. Louis, MO 63005) free choice, in J-feeders mounted on the cages. Pelleted feed usage post-weaning was recorded by treatment. Consumption of pasture was not measured. Feed:gain ratio was calculated

as the amount of feed per treatment divided by the total gain of the rabbits on that treatment.

The eight does that kindled in cages produced 57 kits and the four in the outdoor pens produced 34. Of these, 50 of the kits born indoors and 32 of those born outdoors were weaned. The groups of does were identified as being housed in indoor cages (In) or in outdoor pens (Out). Groups of fryers were identified by location of birth and finishing (InIn, InOut or OutOut, respectively). After weaning, 48 of the fryers born in the indoor cages were randomly assigned to cages within the barn as controls (InIn, n=24) or to the outside pens (InOut, n=24). The two remaining fryers were excluded from the study. All 32 of the fryers weaned in outdoor pens were randomly assigned to one of four outdoor pens (OutOut). The litters were weighed at birth and at 21 days. The kits were then identified with ear tags and weighed individually on days 34 ± 1 , 42 ± 1 (weaning), 55 ± 1 , 82 ± 1 and 104 ± 1 . The variation in weighing days was a result of the litters having been born over a four day period.

At day 104, the rabbits were processed on the farm and carcass and kidney fat weights recorded. Although this age was known to be excessive for the InIn group, the previous work (Way *et al.* 2002) had shown that this much time was required for the OutOut groups to finish. A common age for slaughter was necessary to provide statistical consistency for making future chemical and sensory evaluations of the carcasses. Because of mortality there were 23 InIn carcasses, 21 InOut carcasses and 30 OutOut carcasses available for analyses.

The data were analyzed using the General Linear Models Procedure of SAS (SAS 1988) with housing treatment as the independent variable.

RESULTS AND DISCUSSION

The numbers and performance of the rabbits before weaning are shown in Table 1. The four does in the outdoor pens produced 34 kits of which 32 were weaned. All

Table 1: Numbers and pre-weaning performance of litters (means \pm SE).

Doe location	In	Out
Number of does (litters)	8	4
Number of kits born	57	34
Mean litter weight (g)	448 \pm 35	463 \pm 29
Mean 3 week wt (g)	2040 \pm 131	1895 \pm 165
Number of kits weaned	50	32

those fryers were finished in the outdoor pens. From the 57 kits born in the cages, 50 were weaned. Twenty-three fryers from eight litters born in cages were finished in the cages and 21 were finished in outdoor pens. There were no weight differences at birth or at three weeks for litters from In or Out does.

Eighty of the kits weaned were placed on the trial. The weaning weights and numbers are shown in Table 2. Despite the lack of difference in litter weights at birth or three weeks, the individual fryers from the Out does were significantly lighter at weaning (day 42) than the fryers born in the cages. This may have been a result of differences in milk production of the does, the larger size of the outdoor litters (8.4 vs 7.1 kits), or reduced intake of pelleted feed because of consumption of grazed material that had a lower feeding value. This may also have been an anomaly because of the relatively low number of litters. Prewaning mortality was 12.2% for

Table 2: Effect of doe housing system on weaning weights of kits selected for the trial (means \pm SE).

Kit group	OutOut	InOut	InIn
Weaning weight (g)	569 \pm 16 ^a	670 \pm 19 ^b	678 \pm 18 ^b
Number of fryers on trial	32	24	24
Died	2	3	1

Means in the same row with different superscripts differ significantly ($P < 0.01$).

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the kits born inside and 5.9% for kits born in outside pens. Postweaning, mortality was quite low with 2 of 32 (6.25%), 3 of 24 (12.5%) and 2 of 24 (4.17%) dying in the OutOut, InOut and InIn groups, respectively (Table 2). There was no apparent treatment effect. These values are comparable to the 9.1% pre-weaning and 5% post-weaning mortalities reported by DE LAZZER and FINZI (1992).

Fryers born and finished in the indoor cages (InIn) had higher ($P<0.01$) growth rates, final weights, carcass weights and kidney fat weights than the fryers born indoors and finished on pasture (InOut) or the fryers born and finished on pasture (OutOut) (Table 3). There were no differences in the dressing percentage. The feed: gain ratio, based on the intake of pelleted feed, was numerically higher for the InIn group. For all traits, the rabbits born indoors and finished outdoors were numerically intermediate between the InIn and OutOut groups. The final live weights and carcass weights of the InOut group were higher ($P<0.05$) than the OutOut group. Kidney fat weights of the InOut group were also higher ($P<0.01$). Similar results were found in the previous study (WAY *et al.*, 2002). Because those fryers were processed at a constant weight, there was less difference in the kidney fat content and the feed: gain ratios between the InIn fryers and the other treatments. The high values seen in the current study are a result of the InIn rabbits being held

Table 3: Effect of housing system on postweaning performance and carcass characteristics of fryers (means \pm SE).

Variable	OutOut	InOut	InIn
Number of fryers at 104 d	30	21	23
Growth rate (g/d)	22.7 \pm 0.5 ^b	23.4 \pm 0.6 ^b	28.0 \pm 0.6 ^c
Final weight (g)	2156 \pm 41 ^b	2307 \pm 49 ^{bc}	2640 \pm 47 ^c
Carcass weight (g)	1096 \pm 25 ^b	1187 \pm 30 ^{bc}	1385 \pm 29 ^c
Kidney fat weight (g)	0.9 \pm 0.9 ^c	5.4 \pm 1.0 ^b	15.4 \pm 1.0 ^a
Dressing %	50.8 \pm 0.7	51.6 \pm 0.8	52.4 \pm 0.8
Feed:gain ratio	2.8	2.9	4.8

Means in the same row with different superscripts differ significantly ($P<0.05$)

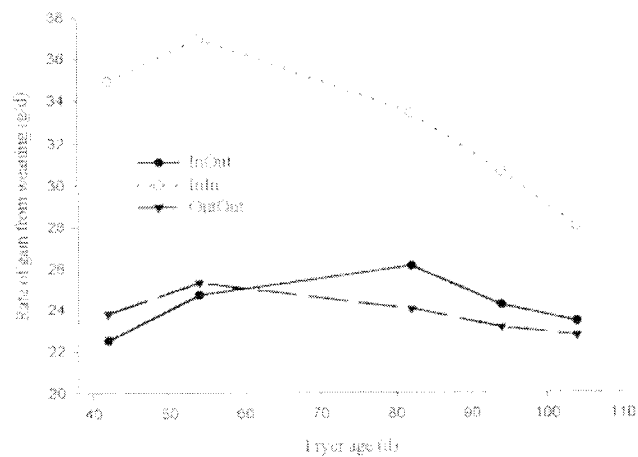


Figure 2: Rate of gain of fryers kindled and finished in cages (InIn), kindled in cages and reared outdoor (InOut) or kindled and reared in outdoor pens (OutOut).

for several weeks beyond the time when they were finished as suggested by PARIGI-BINI, *et al.* (1998) and DALLE ZOTTE (2000). Total post weaning feed usage for the InIn, InOut and OutOut groups was 9.52, 4.90 and 4.44 kg/animal, respectively. The feed:gain ratios of 2.8 and 2.9 for the OutOut and InIn groups, respectively were much lower than the 4.6 reported by DE LAZZER and FINZI (1992).

As shown in Figure 2, the InIn group reached a peak rate of gain of 36.9 g/d at 54 days after which the rate steadily declined. The gains for the InOut and OutOut groups were much less variable and were at a lower level throughout the finishing period. Weight gain for the InOut group peaked at 82 days (26.1 g/d) while the OutOut group peaked at 54 days (25.3g/d). As shown in Figure 3, the fryers finished indoors reached the desired slaughter weight at about 80 days whereas the two groups finished on pasture required the full 104 days. DE LAZZER and FINZI (1992) did not indicate the weaning age but, if it was between 28 and 35 days, the 77 day postweaning finishing period indicates a similar time to reach their mean live weight of 2.2 kg at slaughter. The slower gains of the fryers finished on pasture may be a result of grazing that reduced pellet intake thus causing a lower daily nutrient intake. Providing a more nutrient dense ration for the pastured animals might result in faster gains and earlier finishing.

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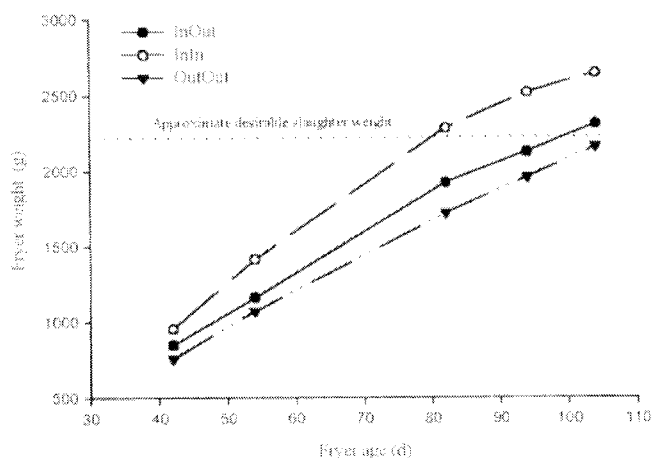


Figure 3: Growth of fryers kindled and finished in cages (InIn), kindled in cages and finished outdoors (InOut) or kindled and finished in outdoor pens (OutOut).

However, though the pasture finished rabbits took longer to finish and required more labor and feed, DE LAZZER and FINZI (1992) pointed out that their “ecological” rabbits sold for \$US 5 per kg live weight compared to the normal commercial price of \$US 2.65 per kg live weight and provided a net income of \$US252.30 per doe per year.

It is thus apparent that rearing and finishing rabbits in movable pens on pasture is an option that can result in reasonable rates of production. It does however require a longer finishing period and more labor but these requirements may be offset by the higher price received for the product in situations where consumers demand, and are willing to pay for, grass finished product. Furthermore, this is an option which might be useful in developing situations where extensive family labor is available. Further work is warranted to study methods of decreasing the time required to finish the fryers.

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