



# Silvopasture Systems for Broiler Chickens: Ranging Behavior and Range Use

*Authored by Leonie Jacobs, Associate Professor, School of Animal Sciences, Virginia Tech*

## Introduction

Allowing poultry access to vegetated, woody spaces benefits poultry welfare. One system that incorporates the production of vegetation and livestock, including poultry, is called a silvopasture system. Woody vegetation can provide a source of income for producers while providing preferred habitat for chickens.

Silvopasture systems are part of an agroforestry approach to animal husbandry, combining production of vegetation with the production of animals. This fact sheet explains how a silvopasture system in poultry production benefits chickens that have access to a range with vegetation other than grass.

## The Jungle Fowl: Ancestors of the Modern-day Chicken

Modern-day chickens show many of the same motivations and behaviors as their ancestor: the jungle fowl. Jungle fowl are native to South and Southeast Asia, and, as the name implies, they are a forest-dwelling species. They show diurnal behavioral rhythms, where they are active and forage (search for food) on the forest floor in the early morning and late afternoon, and rest in the middle of the day and at night, perching in trees.

Jungle fowl prefer a forested habitat, with trees and shrubs. Just like their ancestors, today's strains of laying hens and broiler chickens prefer overhead, natural shelter on their range rather than just open grass pastures (fig.1).



Figure 1. Broiler chickens grown in coops under trees. Even limited canopy cover (here approximately 30%) can increase range use. (Photograph by Leonie Jacobs.)

## Why Chickens Prefer Vegetated Areas

Chickens prefer vegetation in their range, as it serves several functions:

- Overhead vegetation deters predatory birds.
- Trees and bushes allow chickens to hide from predators in forested areas.
- Vegetation mitigates weather extremes: protecting from heat, cold, wind, and rain to different extents (fig. 2).
- Vegetation (compared to just grass) allows for a more varied diet.



Figure 2. Trees and bushes mitigate weather extremes. (Photo by Leonie Jacobs, Virginia Tech.)

## Benefits of Improved Range Use

Providing vegetation in the range, as is achieved in silvopasture systems, may be beneficial to the chickens and the environment in several ways, providing:

- Opportunity for exercise and increased activity. Improved leg strength.
- Reduced risk of footpad dermatitis.
- Greater opportunity to show species-important behaviors.
- Reduced point pollution due to the more homogenous distribution of feces.

In addition, a silvopasture system may provide financial benefits to the farmer, as the vegetation can provide a source of income, either through timber or fruit production. Secondly, it may provide feedstuff for the animals or the producer.

## Poultry Ranging Behavior May Differ Across Flocks and Production Systems

In backyard or small-scale flocks, chickens often have access to an outdoor space. Most chickens in commercial housing conditions do not have the opportunity to venture outside, but outdoor access is part of some production systems, like USDA-certified organic or certified pasture-raised birds. In those, outdoor ranges are often required to be at least the same size as the house; usually, they are in the form of grass pastures between poultry houses. It would not be difficult to incorporate trees in this type of space.

When providing access to an outdoor space is an option, the outdoor space should be designed in a way that the birds will actually use the space. These outdoor spaces can vary: Most commercial operations provide open grass pastures, while small enterprises or hobby farms may have a wider variety of options.

In commercial practice, chickens may not make use of their pasture very much. This can be partially due to the lack of vegetation. A Belgian study by doctoral student L. M. Stadig, published in 2017, found that only 5-13% of pasture-raised broiler chickens will range outside at any given time, and birds that do go outside often stay very close to the house.

Virginia Tech research of commercial, fast-growing broiler chickens is finding that, generally, more birds make use of a pasture when they have natural overhead

cover from trees than when they have access only to open grassland. This is especially apparent in the afternoons, when 5% of the flock roams outdoors, compared with 1% in the open pasture flocks. Researchers also observe that birds with trees on their range roam a little further from their house compared with birds that only have open grass pasture. These numbers are still relatively low, primarily because overhead cover is not the only factor impacting range use.

## Factors that Impact Range Use

### Presence of Shelter

Chickens prefer natural shelter over man-made shelters. Any shelter is preferred over no shelter.

### Weather Conditions and Time of Day

Chickens are quite picky about the weather and will avoid rain, harsh wind, direct sun, and midday heat if they can. If vegetation or shade panels are present on hot sunny days, more chickens will range outside. Most birds will be outside in the early morning and late afternoon, mirroring their ancestors' diurnal rhythm.

### Early Life Experience

Experiences when birds are young can impact their behavior later in life. Free-range use can increase with age and will increase more if birds had been allowed outdoors at an earlier age.

### Fear

Birds that are more anxious or fearful tend to stay indoors. Early life experiences can impact fear, and research shows that broilers on silvopastures (wooded free ranges) are less fearful than birds that just have access to open grass ranges.

### Group Size

In laying hens, larger flocks generally do not range outside as much compared to smaller flocks. Synchronization of behavior may play a role here, or the contrasting conditions between the indoors and the outdoors. For instance, the bright and windy outdoors may be less appealing to a chicken housed in a relatively dark climate-controlled farm, while in small coops (like in figure 1), the contrast between indoor and outdoor conditions is less pronounced.

## Genetic Strain

Differences in range use are found between poultry types (broiler chickens or laying hens, for instance) and within poultry types. These can be caused by differences in activity levels, fearfulness, early-life experiences, or other factors.

## Summary

Like their ancestor the jungle fowl, modern chickens will range outdoors when given the opportunity and when given shelter or natural overhead cover from bushes and trees.

Poultry flocks that get the opportunity to range outdoors can benefit in terms of health and behavioral characteristics. However, many factors impact ranging behavior, including the type of shelter, weather, time of day, early life experiences, fear, group size, and genetic strain.

One component that could stimulate poultry to increase use of the range is to provide natural vegetation other than grass. Although range use is still often limited even when trees are situated on the range, range use does increase, which provides benefits to the poultry.

## Acknowledgments

This project is supported by Southern SARE (project LS20-332).

## References and Additional Resources

Bestman, M. W. P., and J. P. Wagenaar. 2003. "Farm Level Factors Associated with Feather Pecking in Organic Laying Hens." *Livestock Production Science* 80 (1-2): 133-140. [https://doi.org/10.1016/S0301-6226\(02\)00314-7](https://doi.org/10.1016/S0301-6226(02)00314-7).

Campbell, D. L. M., G. N. Hinch, J. A. Downing, and C. Lee. 2016. "Fear and Coping Styles of Outdoor-preferring, Moderate Outdoor and Indoor-preferring Free-range Laying Hens." *Applied Animal Behaviour Science* 185: 73-77. <https://doi.org/10.1016/j.applanim.2016.09.004>.

Dal Bosco, A., C. Mugnai, A. Rosati, A. Paoletti, S. Caporali, and C. Castellini. 2014. "Effect of Range Enrichment on Performance, Behavior, and Forage

Intake of Free-range Chickens." *Journal of Applied Poultry Research* 23 (2): 137-145. <https://doi.org/10.3382/japr.2013-00814>.

Dal Bosco, A., C. Mugnai, F. Sirri, C. Zamparini, and C. Castellini. 2010. "Assessment of a Global Positioning System to Evaluate Activities of Organic Chickens at Pasture." *Journal of Applied Poultry Research* 19 (3): 213-218. <https://doi.org/10.3382/japr.2010-00153>.

Fanatico, A.C., J. A. Mench, G. S. Archer, Y. Liang, V. B. B. Gunsaulis, C. M. Owens, and A. M. Donoghue. 2016. "Effect of Outdoor Structural Enrichments on the Performance, Use of Range Area, and Behavior of Organic Meat Chickens." *Poultry Science* 95 (9): 1980-1988. <https://doi.org/10.3382/ps/pew196>.

Hartcher, K. M., K. A. Hickey, P. H. Hemsworth, G. M. Cronin, S. J. Wilkinson, and M. Singh. 2016. "Relationships Between Range Access as Monitored by Radio Frequency Identification Technology, Fearfulness, and Plumage Damage in Freerange Laying Hens." *Animal* 10 (5): 847-853. <https://doi.org/10.1017/S1751731115002463>.

Stadig L. M. 2017. *Gimme Shelter: Combining Free-range Broiler Chickens with Production of Short Rotation Coppice*. Merelbeke, Belgium: Ghent University, Faculty of Veterinary Medicine. <https://biblio.ugent.be/publication/8538469>.

Stadig, L. M., B. Ampe, S. de Smet, F. A. M. Tuytens. 2014. "Effects of Weather Conditions, Early Experience and Vertical Panels on Slow-growing Broilers' Use of the Free Range Area." In *Proceedings of the 48th Congress of the International Society for Applied Ethology*, 29 July-2 August 2014, edited by I. Estevez, X. Manteca, R. H. Marin, and X. Averós, 185. Vitoria-Gasteiz, Spain: Wageningen Academic Publishers. <https://brill.com/edcollbook-oa/title/68723>.

**Scan to access more publications about poultry.**



<http://bit.ly/41AqRFT>

Visit our website: [www.ext.vt.edu](http://www.ext.vt.edu)

Produced by Virginia Cooperative Extension, Virginia Tech, 2024

Virginia Cooperative Extension is a partnership of Virginia Tech, Virginia State University, the U.S. Department of Agriculture, and local governments. Its programs and employment are open to all, regardless of age, color, disability, sex (including pregnancy), gender, gender identity, gender expression, national origin, political affiliation, race, religion, sexual orientation, genetic information, military status, or any other basis protected by law. VT/0524/APSC-198P