

Ryan Momot

PSP 465

Chicken Production in Sanambele



About the Author:

Ryan Momot grew up in a small town in southeast Missouri. Ryan moved to Montana in 2006 after working in Ennis, Montana on a family friend's ranch. He Started school in August 2006, and currently a student in the environment studies program and construction engineering at Montana State University, and plans to graduate in May 2011. Ryan is interested in Sustainable building construction, and working in the construction industry in the future to develop more sustainable building practices. Ryan is also a devout follower of Jesus Christ and is considering going into the mission's field in the future, to help people in need and spread the love of Jesus Christ to all nations.

Abstract:

This paper is going to examine chicken farming in rural African farming communities, and more specifically in the small village community of Sanambele Mali. It will be addressed the issues involving chicken production, describing the difference between free range non-managed systems, and managed systems using housing. The main goal of this research is to help set up subsistence chicken farming system, which is sustainable for both the village and to the surrounding environment. The hope for the research is for the village to gain knowledge and understanding about the importance of chicken farming, and the benefits of chicken meat as a nutrient for children. A main focus point of the research is on housing and managements techniques, as well as essential health benefits from chickens. The economic benefits of poultry farming will be discussed, but not emphasized.

The Influence and Importance of Chickens in Sanambele Mali Africa

Intro:

In the Village of Sanambele in Mali, there are many concerns within the village about mal-nutrition, one being in the form of Kwashiorkor in the children of the village.

Kwashiorkor occurs when there is a protein deficiency in ones diet. The protein deficiency occurs because there is a missing amino acid in the ten essential amino acids that a healthy human body must have. Amino Acids are the building foundation blocks for proteins. The lack of knowledge and understanding about proteins and proper diets is problematic in most rural African villages. The village of Sanambele has many cultural linkages that define them as a village. Cultural traditions can also become problematic especially in the case of child nutrition. With my interaction with Keriba Coulibaly (a chicken farmer himself), it became clear that there chickens serve a cultural role in the village. When someone in the village has a visitor come and stay with them, a chicken is normally sacrificed. However, there seems to be no cultural barriers with children eating chicken meat.

Chicken meat is a great source of high quality protein and other nutrients as well. The meat has all ten of the essential amino acids that are needed for children and adults. The Chart below from the USDA website shows the nutritional value of chicken meat.

Amino acids per 100 grams Total Protein= 20.3 g per 100 grams

| Amino Acids | Per 100 grams meat | Amino Acids | Per 100 grams |
|---------------|--------------------|---------------|---------------|
| Tryptophan | 0.237g | Arginine | 1.226g |
| Threonine | 0.859 g | Histidine | 0.631g |
| Isoleucine | 1.073g | Alanine | 1.109 g |
| Leucine | 1.526 g | Aspartic acid | 1.812 g |
| Lysine | 1.727 g | Glutamic acid | 3.045g |
| Methionine | 0.563g | Glycine | 0.998g |
| Cystine | 0.260g | Proline | 0.836g |
| Phenylalanine | 0.807g | Serine | 0.700g |
| Tyrosine | 0.686g | | |
| Valine | 1.008g | | |

Currently in Sanambele, the missing amino acid causing kwashiorkor is tryptophan, which shown in the above chart is present in chicken meat. However, children typically consume only chicken intestines and grasshoppers for their meat intake. Unfortunately, chicken intestines and grasshopper meat are not a sufficient enough protein diet for children. From research already done in Sanambele, the availability, and the high cost value of chicken meat seem to be the most prevalent reasons why more chicken meat is not being fed.

The village chickens have the potential to be primary sources of meat in the village if farmed properly. The role of the chicken and the chicken farmer in village can essentially be used to fight malnutrition in the village. The essential part of the equation is setting up an efficient small animal management system that can maximize subsistent chicken production, without moving into commercial chicken production, which would turn chickens into an economic profit base. In order to utilize a management system to its fullest, chicken housing (coops) will be used as well as educating villagers of subsistence chicken farming techniques.

A closer look into sustainable building materials, along with tools and resources in which chicken coops can be constructed, is an essential first step in increasing chicken outputs. In building a chicken coop in Sanambele, it is important to realize the resource

base and understanding sustainably what is available. The importance of the chicken in village is widely realized, but with the growing population, not much research has been made regarding farming chickens efficiently and building coops to control them.

Hypothesis:

By Building sustainable chicken coops, Sanambele Mali will increase chicken production without sacrificing other resources to properly feed the chickens.

Material and Methods:

Through the research in peer review articles, literature was found that pertains to the importance of chickens in African Villages. An article written by M. Mwale and P.J. Masika, looked specifically at parasite control and management role of village chickens. The article focuses on chickens in the East Cape of South Africa. However, there are many relevant points in the article that pertain to chickens in the village of Sanambele. Most other research comes from email interactions with Kariba and his extensive knowledge of chickens and the Sanambele village. In addition, a phone interview was made with Belco Tamboura, which helped with understanding the value and current uses of chickens in the village. Dr. Florence Dunkel was also another source of information for the research. A look at Adam Aucoin’s paper on sustainable agriculture and animal husbandry was helpful in the research. Not much information exists in the peer reviewed literatures, especially regarding sustainable building practices regarding chicken coops. The research is more of an original topic with not much data.

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|---------------------------|-----------------------------|------------------------------------|
| Index or Data Base | Key Words of Phrases | Results (number of hits) 5 |
|---------------------------|-----------------------------|------------------------------------|

| | | |
|---------------------|------------------------|-------|
| GALE | Green Building Africa | 1 |
| GALE | Chicken Coops Africa | 0 |
| Engineering Village | Green Buildings Africa | 18 |
| CAB Agricola | Chickens Africa | 23 |
| Google Scholar | Chickens in Mali | 6,690 |

Table 1:

Results:

In doing research, and by talking with Belco, it was discovered that the University Georgia just recently received a \$440,000 three year grant from USDIA for poultry development in Mali. This grant is part of a larger livestock climate change program at Colorado State University. The 5.25 million dollar grant is an attempt at an interdisciplinary action to research and educate semi-arid regions about climate change and to promote the betterment of small scale animal farming by developing sustainable farming techniques. (Sorrow, April 1) The University of Georgia, in the next three years will be building a small but expandable chicken hatchery. The main goal of the hatchery will be to design a hub that serves as research on the small flock production and for education about animal husbandry and marketing. (Sorrow, April)

University of Georgia has a strong poultry science program in the department of agriculture and environmental sciences. Mike Lacy is a poultry scientist at UGA and his opinion is that “women, along with their children will directly benefit from increased income and improved nutrition.” (Lacey, Mike). This grant going to the University of Georgia correlates well with the research done in this paper. The only thing that is not

addressed in UGA research is the idea of chicken housing, and whether or not housing will be implemented or not.

There are basically just two different types of chicken farming techniques, the first being free ranged, and the second being farmed chicken production. In Sanambele there seems to be neither system in place. It is difficult to call the chickens in Sanambele free range chickens because even free range chickens are still under some sort of management system. The Sanambele system is basically just a scavaging backyard system. It is estimated that 80% of the chicken production in Africa comes from these traditional low input/low output systems. (Permin, A 1) There are some extreme differences in free range chickens compared to farmed chickens. There are inefficiencies that occur in almost every dynamic in the free range/scavaging system.

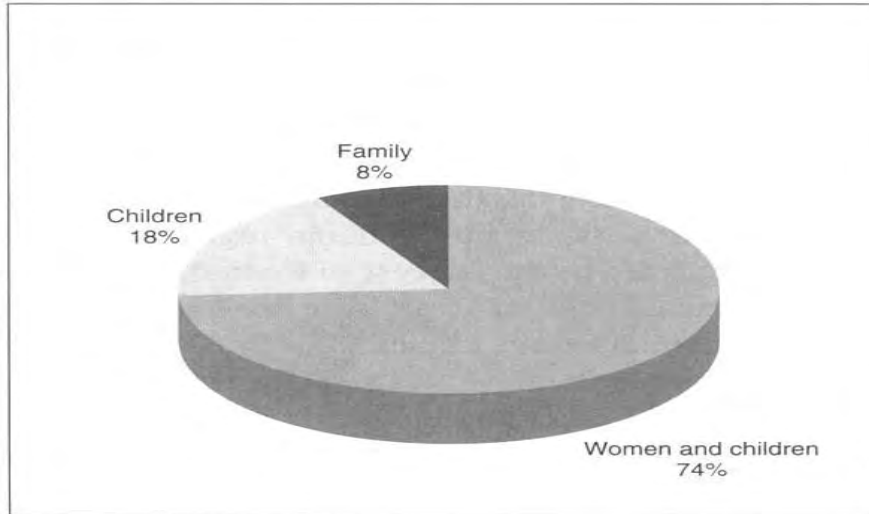
One problem that is typical in rural African chickens is the multitude of diseases. A prominent disease in free range scavenging chickens is the New Castle disease. New Castle disease is a viral disease with signs of the disease typically seen in the nervous system, respiratory, and reproductive systems. The morbidity rate is typically extremely high; however there are vaccinations available to combat the disease.

Poultry is considered to be the largest livestock source of protein available in Africa, which accounts for more than 30% of all animal protein. The majority of the poultry industry comes from chicken production. The low output numbers in poultry chicken production is likely because of diseases and also because there is a lack of supplementary feed and suboptimal management. (Permin, A 2) The level of production is very low compared to higher output systems. The statistics show that scavenging hens may only lay

30 eggs per year, where as high output hens may produce as many as 280 eggs per year. (Permin, A 1). It has been observed that mortality rates as high as 80% after just one year of hatching. Despite all the problems with in keeping chickens alive, if production could improve, it could create an opportunity for even the poorest developed countries to alleviate poverty (Permin, A 2) There are several reasons why chicken production could lead to poverty reduction , as outlined in an article by Permin.

- Nearly all households (poor and landless) own poultry
- There are few religious taboos related to poultry
- Poultry is socio-culturally important
- Low cost technology is needed
- Land is not needed; village poultry is relatively environmentally friendly
- 10 chickens under improved conditions are enough to make a difference for one household
- Poultry production can be a self-sustaining and income-generating system
- Poultry production can serve to build up an entitlement base for poor women

There is a great model in Permin's article called the "Bangladesh Model" which aimed to improve small poverty production, similar to the goal in the Sanambele village. Women from about two million poor households have been involved in the model. With the ability to reach especially poor women, and create additional income for the households, the model has proven to be a great tool in helping combat poverty .This model, is constructed so as to improve small flock holder poultry production, as well as create health and socio-economic development. The model addresses both technical and organizational goals of smalltime chicken production. (Permin, A 2) The model at the village level operates in a free market system, because it is important to be economically sustainable. Small regular income from chicken farming practices, in the hands of women promotes the strengthening position of women in the household and the village in general. (Permin, A 2)

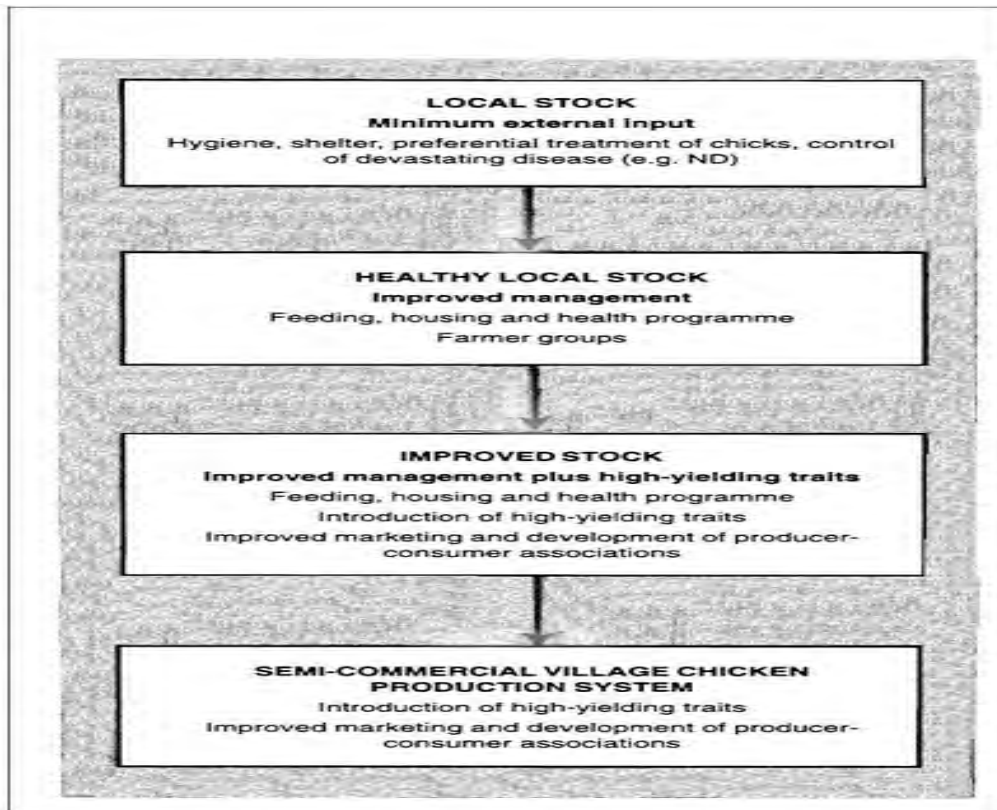


(Mwale, M 2)

Studies in South Africa in Zimbabwe show the importance of women in chicken production.

There are several other management techniques that can be implemented and different farming practices that be done in several ways. The study in South Africa reported that the majority of the farmers (70%) did provide housing for their chickens.

(Mwale, M 1) A clean water source is another variable that would need to be addressed before beginning to increase chicken production. A water source could take to form of a simple pump to the chicken coop, or another well being dug for the chicken coops. Water could be transported daily to the coops for the chickens. Since labor in the village is abundant, there should problems carrying water to the chickens. Another model developed in African countries shows the progression from local stock, to improved stock, to semi- commercial systems in villages.



In the research there were studies taken that show about how long it takes to farm chicken for meat. Free range chickens usually take about 14 weeks before they are able to be used for meat. Farmed chickens in coops, typically only take about 6 weeks of growth before they are mature enough to be eaten (Mwale, M 3). The evidence clearly shows that farming chickens in a chicken coop is far more productive than having free range chickens. However, there is a debate as to whether or not housing chickens is a humane way of farming chickens. If chicken production is to increase, then there has to be a form of management. Free range chickens are not able to reproduce and grow quickly enough to increase chicken production effectively.

With limited resources, chicken production in the village of Sanambele need careful planning and evaluating based on the current income, and what the future population growth rate is expected to be. The growth rate at this point is hard a thing to determine, however it is known that the population is growing, and that there will be a future need for food resources. Not only will sustainable chicken farming create a greater food base, but by eating chicken meat in a regular diet, the children gain the proteins needed with the amino acid tryptophan needed to complete all the essential amino acids.

Building Sustainable Coops:

Sustainable chicken coops can be constructed in a couple of different ways. In talks with Dr. Florence Dunkel, the most sustainable and abundant building material in the village is in the form of clay. Clay is brought up from the river bed to be made into clay bricks that are roughly 12"x6"x7 in size. The bricks are then sundried, and then used in the construction of many of the buildings in the village. The roofs on most of the newer buildings in the village are made from corrugated steel. The steel is bought and shipped into the village.

A more sustainable roof system, that which was used previously in the village is a thatch roof. A thatch roof would not have such a large economic impact as importing a steel roof would have on the village. The clay brick and thatch construction of chicken coop is one proposal of a sustainable type of construction that is easily obtainable; however there are some downfalls when using this type of construction for a chicken coop. Ventilation of the chicken coop is a key component when building a chicken coop. The Clay and thatch

coop construction, leaves some challenges in trying to ventilate the coops in the hot desert like conditions that exists in Sanambele.

Keeping the coops cool helps the chickens stay healthy and more productive. Having the coops built out of clay bricks and thatch roof, means keeping the coops in one stationary place instead of being able to move the coop if need be. Eliminating the roof on coop is a possibility, but leaving off a roof, leads to the possibility of a predator attack on the chickens, and leaving the chickens defenseless trapped in the coop.

Another suggestion for a sustainable chicken coop would be to build a portable chicken coop that could be moved around the village if necessary. There are many benefits in building portable chicken coops. One benefit is that the chickens can be moved to locations that yield the best food source for the chickens. Moving the chicken's coops around to different food plots, makes farming the chickens easier and more productive. In the research done in was found that using the chicken manure as a fertilizer is an idea that helps develop chickens more rapidly. (Aucoin's 4)

The chicken manure can be scraped up out of the chicken coop and then transported to a future site plot for the coop. The chicken manure attracts many earth dwelling insects such as worms and other protein rich insects. Once the coop is moved to the future site, the chicken manure is broken down and has been proven to be a rich fertilizer for the ground, as well as providing a rich bed of bugs that the chickens can eat. The protein rich bugs are a very beneficial to the diet of the chicken. This system of portable chicken coops is an extremely efficient and sustainable system.

A sustainable process for building these portable chicken coops would be using a wood frame open construction technique. I think this type of construction is a very simple technique that can easily be constructed by the Sanambele farmers. It is understood that there is a wood available near the village from neem trees. Large branches and limbs can be harvested from the neem trees. The limbs can then be cut to certain specified dimensions. This simple act of cutting limbs can be done with a simple hand tool such as a machete. The limbs can be cut into pieces vertically 4 feet and horizontally 4 feet to make a square box. The corners of the box can be either overlapped and tied together using rope made in the village, or the corners can be put together by notching the wood out and creating a “Lincoln Log” type connection. Each of these 4x4 cells should be made individually made to house 3-4 chickens each. Then, the cells can be tie or notch together to make a bigger set of chicken coops. Each cell should also have many vertical limbs tied or notched into the main frame to keep the chickens in the cell. Also, if chicken wire were available cheaply, it could be used instead of the many vertical pieces. A raised platform can be added to the coops, so that the manure can drop down and be collected underneath the coop. In the village they have made shelters for goats and cows, it would be extremely easy for the villagers to build housing for the chickens.

Example of a sustainable ark type portable chicken coop built in the United States for sustainable portable chicken farming.



With a phone interview with Belco, it was discovered at just how valuable chickens are, which just gives more reason to implement more chickens into the village. Through talks with Belco, it became evident that feeding the chickens would not be an issue. Corn and other grains in the village can be used to feed them, however there is the possibility of buying food also. With labor abundant in the village, getting water and feed to the chickens would also not be a problem.

Discussion:

With the studies done in South Africa, it was obtained that the main role of the chickens in rural South African villages was for providing a source of meat. Chicken management in the Sanambele village is not a current practice in the village. The village has chickens, but the chickens are currently without an operating structure.

The effectiveness of free range scavenging chicken farming is very low, and with the growing population in the village, it is important that a proposal should be made to begin to build housing for the chickens. I also propose the idea of growing and selling the chickens, in particular selling the eggs as a form of income for farmers. Chicken farming is a relatively simple practice and if done correctly and effectively could be a good revenue source to gain capital for other things in the village. Sanambele is a very content village economically, so it would be important for them to think holistically about what they want the village chicken model to look like.

Education plays a very important role in describing what the chicken model should look like. The villagers should be educated as to the benefits of having more chickens, as well as the responsibility involved in chicken farming. It is important that the women are

involved in this process, as they seemed to play key roles in other successful chicken production models. It is extremely important that we realize the goals of the village, and that they are happy economically, and chicken production should be primarily for subsistence living and not economic gain.



(Subsistent chicken farming)



(Commercial chicken farming)

The process of education should continue on with using participatory diagramming to show how healthy chicken meat can be, and by giving hands on examples of how eating chicken meat can solve the problems the village is having with kwashiorkor.

(Example of participatory diagram)



Recommendations:

My recommendations to the village of Sanambele would be to first get an educated understanding about chickens and the benefits of having more chickens. Next, a sustainable community gathered holistic decision needs to be made regarding the extent to which chickens should be farmed.

The next process would be to implement more chickens into village through the process of some possible micro-loans, or possibly the women's association gathering the money to slowly acquire more chickens into the village. My recommendation next would be that each family would gather between 5 and 8 chickens depending on the size of the family, and then build a small portable chicken coop, from the local material.

Each family should create a small flock size, to create subsistent family chicken farming in the village. If need be, eggs can be grown and sold in the nearby market to pay back possible micro-loans, and possibly buy chicken feed with money. The money then can also be used as a community in the short run to buy hybrid-type chickens that are more suitable for reproduction, also possible vaccinations can be bought if need be. I recommend staying with small flock sizes that would be easy to manage, and keep the flock sizes on a small scale for primarily subsistence use only, and to stay away from semi-commercial and commercial chicken production.

Conclusion:

In concluding, the chicken farming model in Mali looks to be a promising program in the future, and with the right techniques used, the system can be a sustainable and

hopefully a subsistent system in the village of Sanambele. The subsistent village chicken farming system has the potential to eradicate Kwashiorkor in Sanambele. My hope is that we can learn from the many examples I explained that truly worked, and to implement a similar system in Sanambele. Subsistent village chicken farming will have a great impact on the village if implemented correctly, and undoubtedly by establishing a management system and building chicken coops, the chicken population will increase without sacrificing other basic needs or resources, and Kwashiorkor will be eradicated.



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