

Hannah Schiesl
Wahlert Catholic High School
Dubuque, Iowa
Indonesia, Animal Agriculture

Indonesia: Education, Modernization, and Collaboration; Amplifying the Poultry Industry

On the earth today, there are about 7.5 billion people. By 2050, it is estimated that the global human population will reach nearly 10 billion people. It is projected that food production will have to increase by at least 70% over the same time period. (Committee) Consumers demand high-quality foods and continued innovation is key to meeting this quantitative and qualitative crisis. The US has recognized this and within the past few decades has greatly improved both efficiency and technical enhancements of protein production. (Committee) Future challenges for researchers include finding ways to make animal protein production even more efficient while simultaneously reducing its environmental, social, and economic impacts in other parts of the world. This need can already be seen in Indonesia's avian production.

Indonesia, a developing country in Southeast Asia, is the world's largest island country consisting of over 17,000 islands, in which only 6,000 are inhabited. Placed between the Pacific and Indian oceans, it is the world's 4th most populous country with over 261 million people. (Indonesia-Rural Population) It is biologically, physiologically, and culturally one of the most diverse countries in the world. (Kartasubrata, J) There is an average of four people per family but it is also common for relatives to live in the same household. (Indonesia-Rural Population) There is not an exact estimate on what percent of people live in rural versus urban, but on the islands such as Java and Bali the average population density is more than 900 people per square kilometer. (Indonesia-Rural Population) Other islands possess a much lower average population density of about 50 people per square kilometer. Indonesia is a country made of villages. There are almost 68 thousand villages spread across 3,542 subdistricts within 246 regencies in 27 provinces. (Kartasubrata, J) Indonesia is a democratic country but is very decentralized with the local and district governments holding a major role in recent development. (Lubis, D.) The current president is Joko Widodo and, similar to the United States, has an Executive branch, Legislative Branch, and a Judicial Branch. (Indonesia-Rural Population) The government only recognizes six religions: Islam, Protestantism, Roman Catholicism, Hinduism, Buddhism, and Confucianism. More than 87% of Indonesians are Muslim making Indonesia the world's most densely populated Muslim country. (Indonesia-Rural Population) Indonesia used to be considered a third-world country but at the beginning of the 21st century advanced to being considered a developing country. (Kartasubrata, J) Because it is on the equator, the climate is fairly even all year round and almost always tropical. It is a part of the Malesian botanical region which consists of the richest rain forests in the world. (Kartasubrata, J) Unlike the United States, Indonesia does not have rotating seasons like summer, fall, winter, and spring; instead they have only two seasons: a wet season and a dry season. (Indonesia-Rural Population) The farmers must know how to balance production between the two seasons otherwise they will get caught in the dry season's insufficient rainfalls or the wet season's flooding. (Wright, Thome) It is estimated that approximately 30% of Indonesia's land is used for agricultural purposes. (van Horne, Peter) Lots of rain, sunshine, and good soil helps farmers grow a wide variety of produce such as rice, palm oil, natural rubber, coffee, cocoa, cassava, and tropical spices. Large plantations, usually owned by state or private companies, export palm oil and rubber while smaller farms grow soybeans, rice, corn, fruits and vegetables for use by the local population. (Indonesia-Rural Population) Indonesia also features an abundance of natural resources such as oil and natural gas, tin, copper, and gold. (Indonesia-Rural Population) In recent years, it has been shown that people are beginning to migrate away from rice diets and instead embrace eating more animal protein. (Fabiosa, Jacinto) Along with fish, one of the biggest animal protein sources in Indonesia is poultry.

In recent years, the economic gap between the upper class and lower class has been shrinking due to a rise of the middle class.(Brienen, Matthias) Statistics show that as income grows, consumers in lower income countries begin to purchase more expensive sources of nutrition such as meat and dairy rather than cheaper carbohydrate-rich foods. This prospering middle class is pushing the demand for poultry products because it is one of the most affordable sources of protein available in Indonesia.(Brienen, Matthias) The amount of eggs consumed also continues to grow because eggs are inexpensive, easy to process and easy to include in other foods.(Connolly, A) The poultry sector is estimated to provide about 65% of Indonesia's animal protein. This industry's value is estimated to be about \$34 billion US dollars, providing over 12 million jobs.(Cargill) Unlike many other countries, Indonesia does not import or export their poultry meat. Likewise, 81% of their poultry genetics originate from the United States.(Brienen, Matthias) There are about 3.5 million broilers (chickens raised for meat production) and 200 million layers (chickens raised for commercial egg production) in the country.(Brienen, Matthias) Dominating the market, large corporations such as Charoen Pokphand Indonesia, Malindo, Sierad, and Wonokoyo have large broiler farms with fully automated closed houses which can hold between 100,000 to 400,000 birds.(Brienen, Matthias) Though, the majority (95%) of the market is built upon smaller, independent farmers. These smaller farms have open-house systems generally built from bamboo and hold around 3,000-20,000 birds.(Brienen, Matthias) Such operations have raised concerns in food security. These systems tend to be unorganized and without routine guidelines when it comes to feeding or tending cages.(Cargill) Although the conditions of these operations are tolerable, consumers continue to demand higher quality foods. By implementing new food and safety regulations, this industry would be able to guarantee the consumer healthy and hygienic poultry products. Another concern has been constant patterns of oversupply of day-old chicks.(Brienen, Matthias) Which ultimately lowers the price and prevents farmers from collecting the highest yield possible. Additionally, Indonesian farmers also lack adequate knowledge in matters such as feed conversion rates and disease control as well as preventing high mortality rates and bacterial resistance. The main challenge is finding ways to optimize animal protein production while minimizing the environmental, social, and economic impacts. Educating farmers in new and innovative solutions can offer Indonesia's poultry industry the ability to reach its full potential.

One of the biggest things that can be done that would help reduce concerns is simply educating Indonesia's farmers on more beneficial, efficient, and profitable ways to improve production. This could be achieved by setting up a demonstration farm which would allow for staff from various operations around Indonesia to come and learn about the best ways to raise livestock well. Simply, offering farmers a deeper understanding of how to grow fatter chickens with less feed in less time would help these operations to become more independent and grow their businesses. If it were based off of American operations, the demonstration farm could show Indonesian farmers new ways to structure their farms to become more disciplined and orderly. In the United States, there are many more limitations for the poultry industry in place by national regulations.(Griggs) These same strict regulations do not necessarily apply in other countries. Food security is important in all countries but some of the protocols in American operations may not be necessary for Indonesian operations. By teaching farmers about recent developments in avian health, they would be able to raise their chickens more efficiently. Many Indonesian farmers use high quantities of antibiotics to prevent disease but unfortunately this has actually led to bacterial resistance.(Brienen, Matthias) Technology would also allow for better detection of diseases such as Salmonella, Campylobacter, and E. coli.(Connolly, A) In Indonesia, Highly Pathogenic Avian Influenza is an endemic; existing permanently in the region.(Cargill) Especially since these chickens are housed in large groups, keeping avian influenza contained is crucial to preventing high mortality rates. If farmers began using alternative treatments, it would also open them up to a whole new market of antibiotic free products.(Brienen, Matthias) Recent studies have also shown that by administering small doses of antibiotics daily, it not only keeps the chickens healthier but also brings them up to market weight faster.(Brienen, Matthias) Educating farmers on ways to improve their flocks' feed conversions rate would have a large impact on farm profitability. Proper nutrition plays a major role

in optimizing the chickens' feed intake. Rather than building a new farm, the staff on an already existing farm could be trained in the more efficient and profitable ways. That farm could then be where other farmers from around the region visit to be educated. The best island for a demonstration farm to be located would be Java. This is because the population of Indonesia is unevenly distributed and 61% of the population is concentrated on the island of Java.(Kartasubrata, J) The island also has rich volcanic soil and has high agricultural productivity. Additionally, it could be located near larger cities which would cut down on transportation costs. This location would make it easy for the farmers living on Java to travel and take minimal time off from work. A demonstration farm would be worthwhile because, predominantly, it is more likely for people to believe something when they are able to physically see it in person. It would not be forcing any farmer to change their methods, but rather suggesting more beneficial methods. For the farmers who are unable to travel, agricultural extension agents could easily travel to educate the farmers on similar things they would learn at the demonstration farm. Agricultural extension has been used in past decades and successfully made Indonesia self-sufficient in rice.(Lubis, D.) Agricultural extension is reaching out to farmers and teaching them about new scientific research and knowledge of new agricultural practices. The agents would be able to create stronger relationships with the farmers and earn their trust. Since 1945, the Indonesian government has funded agricultural development plans for crops and this same idea could be implemented to educate farmers raising livestock.(Lubis, D.) The local government already has a budget for agricultural development which could be used to fund this education. Today there are about 28,000 government employed extension workers in Indonesia along with many private extension workers hired by businesses such as supplier companies.(Lubis, D.) By not only educating the current farmers but also younger generations, new science and technology could become common knowledge for all.

A second solution would be to transition the traditional open house enclosure to more modern, automated closed house systems. Open house systems have high roofs and open side walls.("Wetter Wet Seasons...") They also rely on manual feeding and natural ventilation which can be inconsistent and inefficient. With Indonesia's tropical weather, open housed systems don't always fully protect chickens from the high temperatures which can lead to high mortality rates.(Brienen, Matthias) Closed housed systems have low ceilings and semi-closed side walls. They also are built with automated feeding, tunnel ventilation, and can be constructed with two levels.("Wetter Wet Seasons...") These systems are much more routine, consistent, and sustainable while requiring less labor. It is also proven that poultry raised in closed house systems have a higher final live weight, lower feed conversion, and have a higher probability of survival which ultimately leads to a more profitable farm.("Wetter Wet Seasons...") When raising poultry, farmers must farm data, not just chickens.(Connolly, A) The digital technologies in a closed house system could improve the efficiency of providing information to the producers.(Connolly, A) One disadvantage to this solution is the cost. It is a much higher investment being almost 9 times more than an open housed system because of all the electricity and technology.("Wetter Wet Seasons...") On the other hand, closed house systems will save farmers money because they don't waste food. In past decades, such technology was not attainable due to access to electricity. Today, 97.62% of the population has access to electricity which allows advanced technology like this to be possible. (Indonesia-Rural population) Farmers are able to connect with others better than ever with the internet.(Connolly, A) They also save energy by maintaining the temperature amongst the flocks.("Wetter Wet Seasons...") Studies have shown that closed house systems are better able to protect the flocks from the harsh environment and maintain steadier production no matter what season it is. Since closed house systems are much more expensive, most independent farmers would struggle to keep up with the costly equipment. Using materials, such as trees, that are naturally grown in Indonesia for the construction of these buildings could also help lower the cost. Buying locally would also help others in the community.

A third solution would be to create co-ops. Through co-operations, 4-6 independent farmers could join together, collaborate and share the capital investment and risks. It could help solve the problems of business uncertainty and excessive costs.(Nembhard, J) Coops have lower failure rates than that

traditional corporations or small businesses.(Nembhard, J) Because of the split investments, the average payback period for closed house systems is 4.5 years.(“Wetter Wet Seasons...”) The economic benefits of closed house systems greatly surpass the original investments.

Contrarily, there are many technologies used in the United States that would not be good solutions for poultry farmers in Indonesia. Robots are commonly found in the American poultry industry. Robots are practical because they don't mind doing monotonous, repetitive tasks or constantly cleaning and sanitizing. (Connolly, A) Although efficient, robots would currently not be appropriate for Indonesian farms because robots themselves are seldom in the region. Virtual reality is also used in the United States when training employees.(Connolly, A) By using virtual reality, employees can learn how to walk through a free-range layer house without frightening the birds, check on hens and find unsatisfactory eggs.(Connolly, A) 3D printing is a third technology that American farms have begun incorporating into the industry. They are able to print on-site plastic or metal equipment when a part needs replacing.(Connolly, A) Virtual reality and 3D printing would not be appropriate for Indonesian farms because there are many other solutions that would be much more accessible.

With change comes questions and concerns. Indonesian farmers may be hesitant to switch or update their operations to more modern techniques because the techniques they have originally been using have worked for several decades. When speaking to a concerned farmer, you could show them results of other farms that have adopted the technology and compare it to their own. You could show them that they are not the first country to be adopting technology into farming. Other developing countries such as India and Bangladesh have had success and are now able to be self-sustaining in some crops.(De Janvry) In general, people are more likely to change their ways if they come to the conclusion themselves rather than being told to do so. If cost was the main concern, farmers could be reminded that, if done correctly, the payback period would be only a few years. Because much of a closed house system is automated, farmers wouldn't need to hire as much staff, therefore saving them labor and money. Once one farmer incorporates technology, it is more likely for other farmers to do the same.

In summary, Indonesia's avian production is evolving into a powerhouse industry of Asia. Consumers are purchasing more poultry products than ever due to higher incomes and the rise of the middle class. Poultry is also one of the most affordable sources of protein available in Indonesia.(Brienen, Matthias) Still, this shift in industry has brought forth concerns in avian production and health. Besides few major producers, a majority of the market is built upon smaller, independent farmers. These farmers tend to lack the necessary knowledge to run an efficient and profitable operation.(Brienen, Matthias) The creation of a demonstration farm would provide local farmers the opportunity to learn about ways to be more productive, improve feed conversion rates, prevent high mortality rates, disease control and avoid bacterial resistance. Agricultural extension could develop strong relationships with farmers and continuously provide them with information. Farmers could join together in co-operations to transition their traditional open housed systems to automated, closed house systems. The overall gain that would come from these advanced systems greatly surpasses the costs. They are efficient with minimal impact economically and on the environment. By establishing new and innovative solutions, farmers would be able to become more independent and grow their businesses while Indonesia's poultry industry would reach its full potential.

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