



eBird: Developing a Telephonic Poultry Trading System for Smallholder Livelihood Promotion and Animal Health Surveillance

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Given the existing structure of the market for informal poultry in the Greater Mekong Subregion, there is significant room to improve the terms of trade among the most vulnerable actors and to extend the system to encourage investment in quality and reduction in disease risk. Building on this idea, we have developed a dynamic mobile telephone based system that provides a more efficient mechanism for directly connecting poultry vendors and farmers. The automated system, known as *eBird*, serves as a platform for trades by directly connecting potential buyers and sellers via text message or an interactive voice message system while allowing for cost-effective forms of disease surveillance.

Detailed market chain surveys of the informal poultry sector in Thailand revealed market inefficiencies typical of many agricultural markets in less developed countries. Within the current poultry market chain structure, middlemen travel from farm to farm on motorbike looking for chickens to buy. They purchase a few chickens from several households and then travel to a market in order to sell to vendors. While middlemen serve important roles in connecting farmers and vendors as well as delivering chickens, the current arrangement has several drawbacks. First, by mixing chickens from many farms in a single delivery, the risk of spreading diseases increases. Secondly, the mixing process loses all information about the source and raising conditions of each chicken. Consequently, it is difficult for market vendors and end-consumers to differentiate between high and low quality animals and in turn prevents producers from benefitting from investments to upgrade quality.

The eBird pilot program, conducted in the surrounding areas of Chiang Mai in northern Thailand, is an attempt to provide a low-cost method by which to greatly improve market efficiency, increase market access for small-scale chicken farmers, reduce price distortions, and provide incentives for farmers to provide high quality chicken meat. The system offers smallholder poultry farmers the opportunity to become more competitive while market vendors enjoy increased reliability of supply. The system is highly adaptive to rapid shifts in supply and demand and offers the farmers a means by which to build a reputation for high quality.

Improving efficiency in the informal native chicken market has the potential to greatly improve livelihoods in rural communities. Leveraging accessible technology to provide improved market access and facilitate the flow of market information has the potential to significantly contribute to poverty alleviation.

Supply Chain Innovations

The eBird system that has been developed enables small-scale native chicken farmers and wet market vendors to easily communicate with simple mobile phone SMS text messaging. Participants also have the option to use a Thai language interactive voice response system if participants are unable to send SMS messages.

If a participating farmer has a group of chickens, a bundle, that he wishes to sell, he is able to open a proposal. He may send a text message with relevant information (number of chickens, weight, chicken type, etc.) to the system phone number, or alternatively he may call the eBird Hotline where he will be prompted to enter the information by the interactive voice response system. Once the proposal has been entered, a text message is sent to all participating vendors in the farmer's area. A vendor that wishes to purchase the available bundle then may respond to the SMS message with the transaction ID number to accept the proposal. This action closes the proposal and if other participants attempt to accept this proposal they will be notified that it is no longer available. If proposals are not accepted within two days of opening the proposal then expires. Figure 1 below illustrates the information flow of the eBird system.

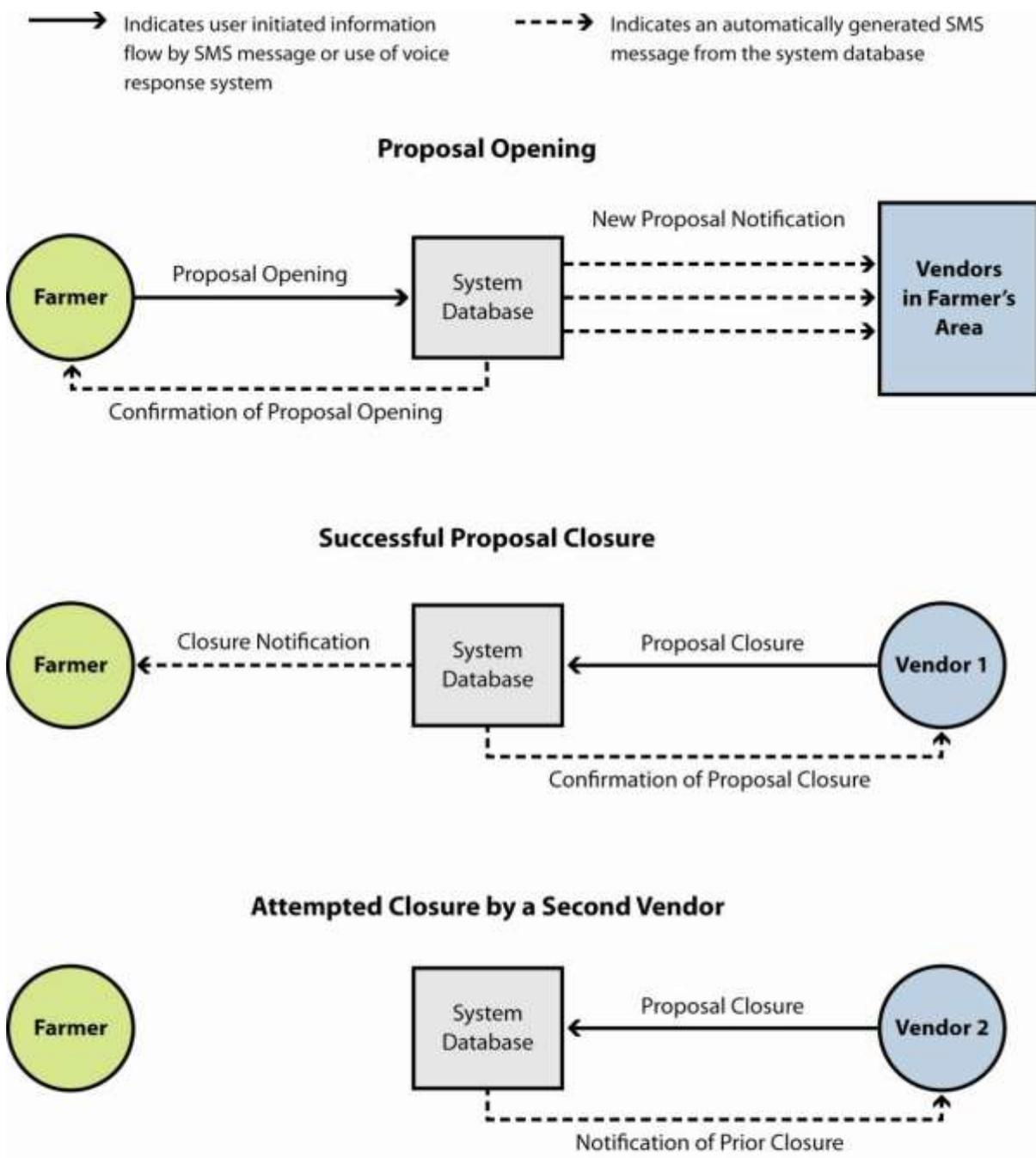
Date, time, and location information is provided to vendors via SMS messaging. The system was designed to function under an arrangement of vendor pickup rather than farmer delivery due to survey results indicating farmer's overwhelming reluctance to deliver bundles of chickens. However in practice, due to long distances and small bundles our team of researchers have, in most instances, provided live chicken transportation of chicken bundles on closed transactions. Following closure of a proposal, a member of our team would visit a farmer's residence. The vendor would then house the live birds until the time of slaughter and transport to market.

Participants are encouraged to provide feedback regarding their satisfaction or dissatisfaction with the performance of the other party involved in the transaction. This is done with the interactive voice response system. This important element of the system gives participants an opportunity to develop a reputation, encourages participants to perform well, and gives farmers incentive to provide good quality meat. Participants are notified of the performance history of the opening party upon notification of an open transaction.

Additionally the interactive voice response system provides participants the ability to opt in or out of the system at any time if they wish to stop or begin receiving opening proposal notifications. In designing this system special attention has been paid to the delicate balance between complexity and ease-of-use. Increased flexibility and greater information

can be achieved with a more complex system but the system must be simple for the end user.

Figure 1: E-BIRD System Information Flow



Assessing the Mobile Phone Trading Platform

The project attempted to assess whether a mobile phone trading platform for poultry could increase producer incomes, improve market supply of local poultry varieties, and offer a low-cost opportunity for implementing both passive and active disease surveillance. Our findings include:

1. Using mobile phones to improve market access can increase producer incomes: On the positive side we found that directly connecting producers and vendors raised the average sale price per bird for producers by approximately 30%. However, the caveat to this finding is that this result only held true primarily for producers selling 10 or more birds (~20% of transactions). For producers seeking to sell less than 10 birds vendors were less interested in navigating the system. These producers were instead often forced to sell to middlemen within the traditional trading system. Consequently, we need to consider whether it is feasible and/or desirable to include the smallest scale producers in our system.
2. Active surveillance and poultry healthcare can be incorporated at a relatively low cost: Using our trading system, we were able to incorporate blood tests and vaccination distribution into our marketing channels. In doing so, we found that targeting blood tests toward selected households actively marketing poultry within a 25 km radius of the major population center could be achieved at a cost of roughly US\$8/sampled farm. In addition, we offered vaccinations with free delivery at the time of blood sampling and 35% of farmers offered this opportunity elected to utilize the available vaccines.
3. Despite the lack of major outbreaks in recent history, a variety of poultry diseases remain endemic in local poultry populations: Blood serology test results showed most of the local poultry population had antibodies against infectious bronchitis (IB) and infectious bursal disease (IBD) virus, around one-third of chickens tested positive for AI antibodies while less than 10% tested positive for Newcastle disease (ND) antibodies. To our knowledge these are the first extensive blood results from the region *not* obtained during an active disease outbreak. Consequently, these results can be used in order to make statements about baseline pathogen exposure.

Table 1: Serology Test Results

Pathogen	# Tests	# Positive	% Positive
Avian influenza virus	500	157	31.4
Infectious bronchitis virus	502	379	75.5
IBD virus	503	495	98.4
Newcastle disease virus	500	37	7.4

Conclusions

This brief note discusses the findings of a pilot study that established a mobile phone based poultry trading system in Northern Thailand. In addition to these specific findings, the approach used in Chiang Mai provides general principles about how mobile phones can be utilized to simultaneously improve market efficiency and provide a platform for targeted disease surveillance.

1. Mechanisms that directly connect producers to vendors can improve market supply. Throughout much of the region poultry farmers sell birds to traders at the farm-gate who in turn deliver to markets. Utilizing mobile phones producers have the opportunity to sell directly to market vendors as demand arises. Surveys of participating vendors revealed that they generally have difficulty finding enough supply to meet daily market demand and thus were particularly enthusiastic about utilizing the system.
2. Bypassing middlemen can increase producer incomes. When selling directly to market vendors, producers can gain part of the premium charged by middlemen for arranging downstream sales.
3. Targeting active surveillance is feasible when market flows are predictable. Because this trading allows observers to identify which flocks are most likely bound for market, it allows for active surveillance targeted to birds which will travel downstream to urban markets. This is important because livestock disease in market bound animals is a much greater health risk than in animals that remain on farms or are otherwise consumed within the village.
4. Systems like eBird allow for passive disease surveillance by monitoring the level of regular trade flows. A sudden, unseasonal drop (or increase) in sales and / or weight at sale could suggest potential disease problems and thus warrant further investigation. Presently, it is very difficult to monitor volumes of trade within the informal poultry trade. From the standpoint of cost efficiency, this form of surveillance is particularly attractive because it would only require action when potential problems are identified.

Mobile phone trading systems (and using mobile phones for marketing in general) have the potential to be important part of targeted disease control policies in Thailand as well as in other countries. These supply chains meet the steady demand from vendors for local poultry varieties while providing an opportunity for cost-efficient disease surveillance that simultaneously increase producer incomes. As we move further away from the time when widespread disease outbreaks resulted in high levels of funding for control measures, it is an important opportunity to develop new approaches to surveillance that are cost-efficient by targeting the livestock populations most likely to affect public health. Accomplishing this while concurrently improving producer incomes and helping urban consumers to secure a steady supply of low cost calories appear to be possible with mobile phone trading systems like eBird.

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