

# LIVESTOCK CENSUS IN AFRICA

## AS A VITAL TOOL FOR LIVESTOCK DISEASE SURVEILLANCE AND CONTROL

N.J. Mapitse<sup>1</sup>, M. Letshwenyo<sup>2</sup>

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**Summary:** *This paper briefly analyses the current status of livestock census in 35 of the 38 countries in Africa which responded to the questionnaire submitted by the authors. The analysis covers activities linked to the collection of livestock census data and its application within the veterinary services.*

*92% of the 38 responding countries conduct livestock census, of which 18 follow scheduled programmes. Of the 15 countries that have an ad hoc programme, only 8 have legislation supporting livestock census either within the veterinary services, the central statistics authority or to a limited extent within the Ministry of Livestock/Agriculture. There was no apparent relationship between absence of legislation, failure to collect tax on livestock (67%) and the frequency to conduct census. The responsibilities to develop census methods, conduct the actual census, and archiving the information was equally shared between the central statistics authorities and veterinary services. The public veterinarians and veterinary paraprofessionals were engaged in 49% of the countries, but private sector and owner declarations were accepted in a significant number of countries. Assessing available livestock resources, determining distributions and densities and having information available for national disease control programmes were ranked top by 83% to 60% of the countries. 71% of the countries always applied census information in animal health decision making, particularly for designing disease surveillance and vaccination programmes. Livestock identification was largely not linked to census programmes but 51% of the 35 countries took opportunity of national population census/ agricultural survey and animal health programmes to conduct livestock census. This provided an opportunity to the animal health professionals to assess sanitary status of livestock during these surveys. Cultural and farmer reluctance to divulge their livestock numbers was the biggest challenge identified in 17 countries. Transhumance, nomadism and constantly moving pastoralists presented challenges to enumerators in addition to the accessibility of remote areas.*

*The OIE may provide technical assistance by developing harmonized livestock census guidelines and solicit funding for training and provision of appropriate census technologies.*

**Key words:** *Africa – disease control – disease surveillance – livestock census – livestock identification – national statistics authority – traceability – veterinary service*

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1 Dr Neo Joel Mapitse, Deputy OIE Sub-Regional Representative for Southern Africa, Gaborone, Botswana  
2 Dr Moetapele Letshwenyo, Deputy Permanent Secretary, Ministry of Agriculture, Botswana

## 1. Introduction

Livestock census is conducted in many countries as part of national human population census or agricultural surveys. Limited resources prevent many countries to undertake a series of livestock census independently from other national surveys. Livestock census is approached differently worldwide and is influenced by the authority which determines the methodology and conduct. The methodology will be strongly directed by the overlying general objective of this national or provincial exercise. The World Census of Agriculture was initiated by the International Institute of Agriculture (IIA) in Rome in 1924, initially with an objective to persuade member countries to provide data based on a uniform plan prepared by the IIA. The main objective was to obtain internationally-comparable data for 1930 through the enumeration of crop and livestock production in one operation. Over time this objective has shifted to that of assisting countries to meet their national objective of census. This was internationally promoted to be conducted every ten years [3]. Veterinary Services rely on the livestock census to develop disease surveillance and control measures as livestock population is the critical denominator. The ten-year cycle for collection of data is not suitable for the Veterinary Services to use the data from the animal health perspective. Veterinary Services are therefore increasingly seeing the need to undertake livestock census for planning purposes.

The World Organisation for Animal Health (OIE) has not yet developed specific guidelines to conduct livestock census. However, the *Terrestrial Animal Health Code* Chapter 4.1 "General Principles on Identification and Traceability of Live Animals" [5] highlights various factors which should be considered when developing a system for animal identification and traceability. These factors have relevance to livestock census and include animal population parameters such as species and breeds, numbers and distribution, types of production, animal movement patterns, trade in animals and animal products, and other economic, geographical and environmental considerations, and cultural aspects. Also, the OIE Member Countries are requested to submit information related to their animal population in their annual report in the OIE World Animal Health Information System (WAHIS). The information collected is then validated and posted on WAHID database [7].

Deductions may be made on the relationship between the level of animal disease surveillance and control and the country livestock census. A country which has updated census information should be in a position to accurately design its animal health programmes since populations are a critical denominator in numerous determinations.

This report briefly assesses the current status of livestock census in Africa, how such data is collected and used by the various Veterinary Authorities within the continent. The reasons for, and the authorities involved in developing methodologies to conduct livestock census and the challenges faced, are also discussed. The report then attempts to relate on how livestock census is a vital tool for disease surveillance and control in Africa.

## 2. Methodology

This work was conducted through administration of a questionnaire to all 53 OIE Delegates from Africa. A cursory input analysis of the responses from 38 countries<sup>3</sup> was performed. The main objective was to determine if countries in Africa conduct livestock census, and if so, if livestock census is considered a vital tool for livestock disease surveillance and control.

The report covers factors that may impact on livestock census. These include taxation of livestock and levels of farmer cooperation as these can have an impact on the outcomes. Format of data (by administrative level and farming systems) and its availability to stakeholders were also reviewed to determine the extent of use of census information.

Authorities responsible to determine methodology (comprehensive enumeration, enquiry, statistical sample or owner declaration), to conduct livestock census and prescribe the data presentation format, are evaluated and compared, as they determine the objective of the census programme

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<sup>3</sup> Algeria, Angola, Benin, Botswana, Burkina Faso, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Congo Republic, Cote d'Ivoire, Equatorial Guinea, Ethiopia, Ghana, Guinea, Kenya, Lesotho, Malawi, Morocco, Mauritania, Mauritius, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia and Zimbabwe

and attempt to include animal health related parameters. The involvement of animal health professionals was evaluated as well as their ability to identify animal health issues during census and thereby improving disease surveillance.

Countries were requested to rank the objectives for conducting livestock census ranging from purely assessing available livestock resources to animal health, marketing and trade. Legal basis for conducting livestock census was also determined and the impact of legislation on frequency and level of farmer cooperation were assessed.

In an attempt to determine how livestock census influences disease surveillance and control in the OIE Member Countries in Africa, the report discusses the rankings of specified activities where countries utilize livestock census in decision making. The report concludes by evaluating the challenges faced when conducting livestock census and the proposals on how the OIE may contribute towards improving disease surveillance and control through livestock censuses.

### 3. Survey findings

#### 3.1. Livestock census legislation

Majority (92%) of the responding countries conduct livestock census compared to the other 8% which did not, due to lack of human and financial resources. A total of 20 countries have never or have conducted census in an ad hoc manner. Of these, only 9 have supporting legislation which may be housed with the Veterinary Services, the central statistics authority or within the Ministry of Livestock and/or Agriculture. At least 26% of the countries conducted annual census compared to 11% that have never or executed it every ten years. Two (2) countries conduct a biannual and to some extent a quarterly census on certain livestock.

Table 1 shows that 17 countries did not have any supporting legislation providing for livestock census. Acts and regulations, orders and or decrees were developed in 21 countries from time to time to support livestock census. In the absence of acts, ministerial circulars are used as an administrative arrangement to support livestock census programmes.

**Table 1.– Frequency of livestock census and census legislation**

Legislation	Frequency of livestock census			
	Ad hoc	Never	Scheduled	Total
No legislation	7	4	6	17
Legislation present	8	1	12	21
<b>Total countries</b>	<b>15</b>	<b>5</b>	<b>18</b>	<b>38</b>

Three (3) countries reported not to have done livestock census in the last thirty years at least at national level but had census reports at lower administrative levels, though the provinces did not have harmonized systems. The same countries which did not conduct census also did not collect taxes on livestock. Two thirds (67%) of the countries did not collect taxes on livestock and out of those that applied tax on livestock, 8 had these at national and 11 at local levels. National taxes included export/import duties, market and slaughter levies, and value added taxes. Local taxes covered slaughter levies, local withholding, transhumance and market taxes. Two (2) countries applied annual administrative tax per head as a cost recovery measure and certificates withholding tax on livestock. About 50% of the countries that did not collect tax reported receiving good cooperation from farmers during census exercises. Census may in certain instances be linked to taxation based on total number of livestock owned.

#### 3.2. Authorities involved in livestock census

The responsibilities of determining livestock census methodology were shared between the central statistics authority and the Veterinary Services in 46% and 41% of the countries, respectively. Relevant agencies or government departments of livestock resources, research and statistics within the Ministries of Livestock or Agriculture also had the authority to

develop livestock census methods. No country outsourced or used the private sector for developing census methods.

The methods employed were comprehensive enumeration (total counts), enquiry and statistical sampling as indicated by 22, 19 and 13 countries, respectively. The statistical method in some cases was on the basis of villages such as in Tanzania. Seven (7) countries applied all the three methods of census whereas 6 applied both total counts and statistical sampling. The statistical sampling was used where animals such as poultry presented enumeration challenges.

The actual carrying out of the livestock census programme was equally shared between the veterinary services and the central statistics authority by 35 and 33%, respectively. Animal production directorates came third at 21%, thereby making over 56% of the countries having the responsibility of livestock census within livestock authorities. The other 11% includes directorates or agencies within the ministries of Agriculture or Livestock or collaborations with training/research institutions and ministries responsible for planning. Some countries use consultants and benefited from collaborations with the Food and Agriculture Organization of the United Nations (FAO) to develop livestock census methodologies.

Public veterinary paraprofessionals were engaged in 29 countries compared to 14 that used agents from the central statistics authority and other technical personnel. These technical personnel may not be trained on animal health. Almost half (49%) of the responding countries engage only public veterinarians and veterinary paraprofessionals to conduct livestock census. Thirteen (13) countries accepted self declaration by livestock owners or use public veterinarians. Private veterinarians and paraprofessionals also conduct livestock census as reported by 11 and 6 countries, respectively. The role of private animal health agents should be outlined clearly when engaged in livestock census [6]. The engagement of public animal health professionals allows for provision of a cost-effective service and nurtures trust as public personnel offer the opportunity to coordinate animal health activities with census across wide areas including conflict border areas and other marginalised areas [2].

The veterinary services and the central statistics authority were involved as custodians of census information in 23 of the 35 countries that undertook livestock census. Eleven (11) countries listed both authorities as responsible for the information. The same number of countries had animal production authorities responsible for data archiving. The remaining respondents stored census information within the ministry involved with livestock or a department involved with statistics and research within the ministries of Agriculture and Livestock.

### **3.3. Animal health parameters included in livestock census**

All countries enumerate bovine species and about 30 countries count sheep, goats, small ruminants, equine, pigs and poultry during census. Camels and domestic cats were covered by 15 countries whereas domestic dogs were enumerated by 20 countries. Lagomorphs (rabbits) and honey bees were covered by less than 30% of the countries. Farmed aquaculture is not very widespread in Africa and only 2 countries reported collecting production figures on the fish industry. Other animals identified in census were primates (monkeys) and deer.

A significant number of countries indicated the need to include animal health parameters such as vaccination and disease occurrence when conducting their livestock censuses. Vaccinations include history, costs, doses used for transboundary animal diseases such as anthrax, foot and mouth disease and rabies. Other parameters mentioned were rates of morbidity and mortality, sanitary or biosecurity measures applied, nutritional status of animals, animal identification (branding), access to veterinary products, treatments using antibiotics, trypanocidal drugs and parasiticides.

Accreditation of herds and their health status—for diseases such as bovine tuberculosis and brucellosis—were also indicated by South Africa. Evaluation of animal health infrastructure was also listed as a critical parameter assessed. Animal movements and identification of transhumance corridors were some of the parameters considered. This is an indication of the

need to collect animal health information at any given opportunity and livestock census provided for such an opportunity for the veterinary services.

### **3.4. Reasons for conducting livestock census**

Analysis of the six purposes of conducting the livestock census indicated a variable response. 74% of the respondents ranked assessment of available livestock resources as the first reason to conduct livestock census. However when considering the top-three reasons for each country, 'assess available livestock resources' rises to 83%, showing that this justification continued to be ranked higher than the others, while 'determine spatial distribution and density of livestock' and 'disease control programmes' were shown to be other higher ranking objectives of livestock census (in 60% of the countries); 'disease surveillance' (43%), 'livestock productivity' (34%) were followed by 'marketing and trade' in 20% of the countries.

### **3.5. Storage databases**

Livestock census data is kept by most directorates or authorities in at least two different databases. At the national level the Veterinary Services and the Statistics Authority were represented in 27 and 26 countries, respectively. At the regional level databases such as the Regional Economic Communities databases were used by 10 countries whereas 16 countries reported using the OIE World Animal Health Information System or Database (WAHIS–WAHID) at international level. However 90% (34/38) of the responding countries have census data on WAHID, suggesting under-reporting through the questionnaire. Other databases are within the respective departments of the ministry responsible for livestock and/or agriculture where they are involved in development of methods and conducting livestock censuses.

Almost all (97%) of reporting countries have their census information available by administrative levels and 18 reported data being available by farming systems. About (49%) of the respondents have their data available at both administrative level and by farming systems. Five (5) countries identified groupings in which data can be provided, such as by households and production categories. The level of technology in a country determines the variation of information [1] and types of database used to store such information.

### **3.6. Activities linked to livestock census**

80% of the respondents do not link livestock identification to livestock census programmes. Countries use different methods of identification and these have changed in line with technological developments, and their use depends on factors such as type of animal and purpose of identification [1]. These vary from area/zonal based through herd identification to individual methods. Applied methods included the inexpensive branding that are owner-, zone- or area-related, ear notches, tattoos, animal passports, ear-tags which may or may not be electronic, microchips and other electronic individual animal identification using radio frequency identification device placed as a reticular bolus. The characteristics of these methods —e.g. durability and cost— are discussed [1].

Five (5) countries do not combine livestock census with any other activities, and these also do not relate census to livestock identification exercises. Four (4) of these countries have their livestock census methodology determined by either the central statistics authority or another department within the ministry of livestock. Again 4 of these countries reported poor-to-fair cooperation with farmers during census exercises and do not collect tax on livestock. Over half (51%) of the 35 countries undertaking census took advantage of both national human population census and animal health programmes to conduct livestock census concurrently. Assessing the activities individually, 24 countries linked livestock census to each of the above activities, with 12 using the opportunity of other animal management programmes not related to animal health. Other opportunities used to conduct livestock census were during transhumance livestock movements and inspection of livestock registers. Livestock identification and traceability systems are correct tools for epidemiological surveillance and prevention systems and veterinary services can have livestock numbers and movements from surveillance exercises [1].

### 3.7. Dissemination of livestock census information to stakeholders

Only 1 country did not subject its livestock census data to any statistical analysis or a quality control check and did not collaborate with the central statistics authority in the development of livestock census methods. Various stakeholders benefitted from census information and these include the public and private sectors, intergovernmental and international organisations, development partners, research and teaching institutions, farmers associations, non governmental organisations, financial institutions, traders, importers of veterinary requisites and organised agriculture. Livestock census information is also available on request or is published on the internet [4]. The public sector in this case is represented by various government ministries and departments and both central and local government levels including policy makers.

### 3.8. Challenges faced during livestock census activities

All countries face challenges at various levels ranging from absence of legislation, through to inappropriate methodologies, unsatisfactory analysis of data and late publication. The countries listed the challenges encountered and these were categorised as shown on [Table 2](#).

**Table 2.– Challenges faced by authorities when conducting livestock census**

Challenges	No. of countries responding
1) Cultural/Farmer reluctance	17
2) Accessibility/Remoteness	14
3) Financial resources	13
4) Technical expertise	13
5) Transhumance and animal movements	11
6) Institutional arrangements	9
7) Related infrastructure (hard and soft)	7

The biggest challenge encountered and identified by 17 countries was reluctance of farmers to allow counting of their stock as it was not permissible under their customs and traditions. This reluctance due to cultural believes was not total in some countries and peculiar to any particular sub-region of Africa. Mistrust of the enumerators by farmers existed in some countries and lead to farmers not bringing their animals for census. Mutual trust can be developed by using cost-effective veterinary paraprofessionals who interact with farmers or pastoralists routinely [2, 6]. Unavailability of farmers particularly in peri-urban areas was encountered as either livestock would not be availed or the caretakers were hesitant to allow the enumerators to conduct the census. Two (2) countries related this farmer reluctance to taxation where in one incidence they would pay higher taxes if they possess a large number of livestock. However 41% of the countries encountering reluctance, collected tax on livestock.

Inaccessibility due to poor communication network, remoteness, landmines, flooding and/or civil unrest were identified contributing to poor or lack of census data in 14 countries including Angola, Chad, Democratic Republic of the Congo, Ethiopia, Ghana, Niger, Nigeria, Sudan and Zambia. Transport shortage coupled with a situation where smallholders were dispersed over vast expanse of un-serviced land also contributed to poor livestock census. Lack of financial resources and technical expertise within the country to develop methods for conducting and analysing census data were mentioned in 12 countries —including those that have never conducted census— as contributing factors. Lack of appreciation for conducting a proper census and the output of such a national exercise were not always apparent to the extension officers who were also in short supply in certain instances added to poor census data. Field enumerators lacked supervision by veterinarians and their roles were not clear as is required.

Livestock transhumance or nomadic systems in some West and East African countries and the pastoral or communal rearing systems in other parts of Central and Southern Africa were identified in 11 countries. The perpetual movement of pastoral communities is a more critical

factor than where livestock are free roaming but communities remain on one location. Free-roaming livestock, even if there was an attempt to round them up, is never effective.

Institutional arrangements refer to how government entities involved in census are related and influence each other regarding livestock census. This challenge ranked 6 out of the 7 categories, and was identified by 9 countries. The specific problems identified included the development of census methodologies by the central statistics authority that were not appropriate and beneficial to the veterinary services. National master plans for sampling during national surveys were found not applicable to the distribution of livestock in countries such as in Tanzania and they did not provide for the capture of animal health related parameters as in Kenya. Insufficient supervision of the enumerators by the veterinary services also contributed to problems faced during livestock census. These enumerators may be engaged by the central statistics authority or other agencies within the ministries of livestock or agriculture when conducting livestock census.

South Africa and Zambia identified lack of harmonised protocols, either within the country or harmonised to international acceptable levels of agricultural census. Livestock censuses were conducted at provincial level and each province applied its own methodology. The absence of nationally harmonized protocols also created room for differences in the timing and willingness to conduct livestock censuses. Where livestock census was linked to other animal health activities, such as community dipping, the failure of these sanitary programmes led to inconsistencies in turnout especially in smallholder areas as observed in Zimbabwe as there was no incentive to bring livestock to the dip tanks.

Another specific institutional arrangement challenge identified was delayed publication and distribution of livestock census information to livestock industry stakeholders. This occurred when livestock census data analysis and quality control were linked to other national surveys. By the time it is publicised, it is often perceived out of date by the stakeholders.

The last category of challenges was identified by 7 countries and this was lack of infrastructure to conduct livestock census. This category includes sanitary infrastructure such as crush pens or holding races for both bovines and small ruminants and computer software with geographical information systems (GIS) tools and data analysis software. The holding areas may also be too far for some type of animals to be presented to the enumerators especially where smallholders are spread over vast expanse of land.

### **3.9. Use of census data in decision making**

The purpose of this section was largely to determine whether livestock census data is used by the veterinary services in making decisions regarding animal health. However this was extended to cover other issues such as guidance on animal production policies and any other activities as may be seen by the respondents. The additional activities identified were the determination of livestock contribution to national gross domestic product, production estimates, forecasts and the livestock trade, specifically imports and exports.

71% of the responding countries reported always using census data in decision making, whereas 29% used the data sometimes. These decisions were ranked for each country and then rankings used to determine prioritised activities for all. This analysis suffered from absence of ranking for certain activities by some countries assuming they did not undertake such activities. These included farmer compensation, disease eradication and distribution of veterinary products.

The analysis shows that 91% of the 35 countries conducting census, ranked 'designing disease surveillance programmes' the top activity where livestock census data is used. This relates well with other developed nations such as Argentina, Australia and Canada, which have strong linkages between livestock numbers and movements and epidemiological surveillance [1]. 'Designing vaccination programmes' follows immediately, with 80% of the countries listing it on top-four activities. The use of census data to guide 'budget allocation' and 'guidance for animal production policies' followed at 54% and 51%, respectively. Of interest is to note that 11 countries ranked application of livestock census data in 'budget allocation' first. A significant number of countries did not rank 'planning farmer

compensation allocations', 'procurement of laboratory consumables' and 'human resources allocation', or ranked them much lower.

### 3.10. Contribution of the OIE towards livestock census

A significant number of countries proposed that the OIE may contribute to livestock census by developing guidelines on methods providing for a uniform and standard way of conducting livestock census and inexpensive methods of livestock identification. However these methods should be appropriate and adapted to the Sahelian context marked by animal movements and transhumance. These capacity-building initiatives will have to be assessed on the backdrop of existing guidelines and recommendations including the evaluation of the performance of veterinary services using the OIE-PVS Pathway. In addition, the OIE may support its Member Countries by having provision for training managers and enumerators on the conduct, analysis and importance of livestock census to disease surveillance and control. In recognition that total counts were costly, the OIE may provide technical assistance in validating statistical populations sampling methods to obviate the costs. Legislative support in situations where there is no livestock census legislation was also highlighted. Animal identification is important as it will facilitate census and consequently disease surveillance and control and therefore the OIE should emphasise implementation of livestock identification by its Member Countries. Lastly, the OIE may assist Member Countries to solicit funds from international donors to conduct census and provide computer hardware for data capture and analysis.

## 4. Conclusion

Accurate and up-to-date livestock census is vital for designing animal health programmes, including assisting national veterinary services to allocate budgets and develop appropriate livestock policies. Although majority of African countries conduct livestock census, a significant number of them have no scheduled programmes. Ad-hoc events do not provide for updated and comprehensive data for an informed decision making.

The lack of census legislation can neither be linked to the absence of ad-hoc census, neither the collection of taxes on livestock be considered as a limiting factor. A significant number of countries utilize administrative arrangements to conduct census in the absence of legislation and their success relies on the mutual trust developed between the veterinary services and the farmers. This trust may be cemented even more by utilizing public veterinarians and public veterinary paraprofessionals who through their normal routine activities interact with farmers and have no linkages with revenue institutions. These paraprofessionals in some instances move with the pastoralists and provide low-cost basic services to these communities. Therefore the different roles of these officials and the purpose of conducting livestock census should be explained clearly. Supervision of the field enumerators by veterinarians is essential in fulfilling the objectives of livestock census [2].

The authorities involved in livestock census were equally shared between the veterinary services and the national or central statistics authorities. The importance of the central statistics authority can be shown by the top-three objectives for conducting livestock census identified as to 'assess available livestock resources', to 'determine spatial distribution and density of livestock' and for 'disease control programmes'. This institutional framework provides for collaboration and sustainability where veterinary services may not be able to conduct the livestock census due to lack of funds. It is the responsibility of the veterinary services to ensure that their objectives are included at the planning stages of the census methodology if the livestock census is to benefit livestock industry. This close collaboration is important to expedite the analysis and publication of the report at the earliest.

Livestock census in Africa faces various challenges mainly due to the smallholders dispersed over the vast rangelands with limited sanitary infrastructure, inaccessibility of remote areas, lack of transport and in some instances institutional arrangements not being conducive. Some type of nominal taxation of livestock may have to be considered to recover some costs so that the livestock census exercises may be sustainable. The judgment whether to link livestock census with other national surveys will be determined by the benefits, but for animal health programmes it is recommended to link the two activities to benefit from increased surveillance especially when trained animal health technicians are involved.



Cultural and traditional beliefs and reluctance of farmers to divulge their livestock numbers remains a critical limiting factor to livestock census in Africa. Education and cultivating mutual trust is recommended. Modern technological advances in animal identification and data collection are available to efficiently and effectively conduct national livestock census in Africa.

Animal transhumance and pastoralist animal movements may be peculiar to Africa and census methods should be adapted to address this phenomenon. In the absence or shortage of funding, a statistical sampling method for census may be the method of choice. The OIE Member Countries require technical and financial assistance in the form of developing and adopting guidelines, acquiring technologies and expertise to enable them to conduct livestock census, whose output is vital in planning disease surveillance and control programmes. However these guidelines are already available for general agricultural census.

The analysis could not categorically prove that livestock census in Africa is a vital tool for disease surveillance and control since the analysis was on the inputs rather than the outputs of the questionnaire and due to time the status of disease surveillance and control of the responding countries could not be assessed on the basis of their responses on the livestock census.

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