CURRENT STATUS OF LIVESTOCK REPRODUCTION AND THE USE OF ADVANCED REPRODUCTIVE BIOTECHNOLOGIES IN ECUADOR

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International Training Course on Dairy Herd Improvement by the Use of Reproductive Biotechnologies, held on July 13-22, 2015, at Philippine Carabao Center, Science City of Muñoz Nueva Ecija, Philippines.
### Ecuador

**Capital**
- Quito
- Coordinates: 00°9'S 78°21'W

**Largest city**
- Guayaquil

**Official languages**
- Spanish[1]

**Recognised regional languages**
- Kichwa (Quichua), Shuar & others "are in official use for indigenous peoples"[2]

**Ethnic groups (3a)**
- 71.9% Mestizo
- 7.4% Montubio
- 7.2% Afroecuadorian
- 7% Amerindian
- 6.1% White
- 0.4% others

**Demonym**
- Ecuadorian

**Government**
- Unitary presidential constitutional republic
- **President**
  - Rafael Correa
- **Vice President**
  - Jorge Glas

**Legislature**
- National Assembly

**Independence**
- **Declared**
  - from Spain: May 24, 1822
  - from Gran Colombia: May 13, 1830
- **Recognized**
  - February 16, 1830
  - Current constitution: September 28, 2008

**Area**
- Total: 283,560 km² (75th)
- 109,484 sq mi

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**Galapagos Island**

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Overview of Livestock Production in Ecuador

Latin America and the Caribbean produce more than 23% of beef and buffalo meat, and 21.40% of poultry meat in the world. In the case of eggs and milk, the participation of the region is more than 10% by weight and 11.2%, respectively.

Ecuador is an agricultural country that underpins much of its economy on agricultural activities which have about 40% of its population; however, 84% of rural households own livestock, averaging 2.8 per household heads. It is estimated that there are 5 million heads of cattle in Ecuador, with an average of 298,000 farmers.
There are also private companies that are dedicated to the selection and sale of genetically advanced cattle sires collected in Ecuadorian farms, adapted to our regions, such as Jersey, Brown Swiss, Dairy Gyr, Holstein, Pizan, Gir-Holando, Charolais, Hereford and Norman (Biogensa, 2014). Those animals were introduced in the past to Ecuador from USA, Canada, Brazil, etc.
Related to the Buffalo production, there is very little information about buffaloes in Ecuador. The first importation was made from Trinidad in the 1980s and like in other countries they use the buffalo only as a labor animal. But a herd of approximately five thousand buffaloes is at the hands of no more than five Big Raisers, thus giving very good possibilities to study about its virtues.

It can be said that Ecuador is at the primary stage of buffalo industry development for which, fortunately, it can count on the integration and sense of cooperation offered at world level by the buffalo breeding countries like the Philippines.

Olsen Farm, Bucay Ecuador
In this year, Ecuadorian government has imported genetically superior animals to provide the farmers, as a means to raise production of meat and milk in the country, 3000 in total was imported from Paraguay.
Livestock Population

Livestock production is widespread throughout the country. Livestock keepers mainly raise cattle, sheep, goats, pigs and chickens. A distinctive characteristic, typically for the region, is the general predominance of dual-purpose livestock production over specialized beef and dairy production systems.

Table 1. Livestock population in Ecuador. Expressed in 1,000 heads

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<tbody>
<tr>
<td>Cattle</td>
<td>3,005</td>
<td>4,359</td>
<td>4,486</td>
<td>4,794</td>
<td>3.8</td>
<td>0.3</td>
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<tr>
<td>Sheep and goats</td>
<td>1,354</td>
<td>1,730</td>
<td>2,505</td>
<td>2,759</td>
<td>2.5</td>
<td>3.8</td>
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<tr>
<td>Pigs</td>
<td>3,549</td>
<td>2,220</td>
<td>2,721</td>
<td>2,959</td>
<td>-4.6</td>
<td>2.1</td>
</tr>
<tr>
<td>Poultry</td>
<td>32,799</td>
<td>51,391</td>
<td>136,212</td>
<td>143,230</td>
<td>4.6</td>
<td>2.4</td>
</tr>
<tr>
<td>Total LUs</td>
<td>3,454</td>
<td>4,293</td>
<td>5,433</td>
<td>5,804</td>
<td>2.2</td>
<td>2.4</td>
</tr>
</tbody>
</table>

For Water Buffalo, about 5,000 heads are present, of river breed, owned by rich people.

SLU: Livestock Unit; conversion factors: cattle (0.70), sheep and goats (0.10), pigs (0.25) and poultry (0.01). Source: FAO (2005)
Figure 1. Trends in annual per capita production of meat, milk and eggs in Ecuador.

Figure 2. Trends in annual per capita consumption of meat, milk and eggs in Ecuador.

Source: FAO 2005
In Ecuador, fresh semen is minimal for use in artificial insemination.
Most of semen comes from other countries like the United States, Brazil and Canada.
The ABS of the United States is usually the source of frozen semen.
The quantities imported are not well known, since private companies carry out this activity.
The use of semen in artificial insemination has an efficiency of 60 to 70% pregnancy rates and is performed by contracting technicians.
Current effort is exerted to further improve the efficiencies by means of performing studies that may increase the accuracy of estrus detection.
Embryo in vitro production

 Attempt for in vitro fertilization (IVF) of genetically superior animals was also initiated but reports on the development were not presented. This is carried out by Big Time Livestock Raisers. The government, however, through MAGAP and SENESCYT are collaborating to develop this technology and are on the process of facility and technical development. The technique of IVF is used worldwide and is helping the breeding of the species. Herradón (2007) mentions that numerous efforts to improve the efficiency of IVF, continues doing poorly, estimating a rate of 30 to 40% of oocytes capable of becoming transferable embryos.

Photos derived during a training course in ESPAM-MFL, May 23-June 12, 2015
EMBRYO COLLECTION

The Research Institutes such as INIAP and MAGAP, El Rosario, and some private companies are conducting this kind of activities, however; there is not data available of the yearly production of embryo through this technology. Technical expertise remains the limiting factor, hence, training is a priority.

Photos derived during a training course carried out by SENESCYT through UTB, ESPAM-MFL and the Ministry of Agriculture (MAGAP)
EMBRYO TRANSFER

In Ecuador, there are few companies that focus on genetic improvement of cattle where they use biotechnological tools such as multiple ovulation and embryo transfer in their breeding program. They usually collaborate with service providers abroad like Colombia who have the expertise in the field.

Small scale farmers who accounts higher proportion cannot afford. Hence, the government has initiated technical enhancement by sponsoring training courses in order to have this service be made available to all the livestock raisers, big or small.
Cryopreservation for embryo and semen

National institute have the equipment to apply these technologies. This picture shows an embryo freezing equipment in El Rosario of MAGAP. However, activities on this area is limited by lack of personnel who have the expertise. Hence, not regularly implemented. A campaign was initiated to establish a National Breeding Program for Livestock Improvement and develop the skills of the staff through training.
That's why it is necessary to implement more efficient biotechnological techniques in Ecuador, under government initiatives, to improve the genetics or spreading highly productive animals adapted in the region to increase the income of farmers and meet the national demand of milk and meat. The good thing is, the livestock farmers are interested and the SENESCYT through the universities and MAGAP are collaborating.
Ecuadorian Government support for training by International Scientists From Japan and The Philippines on Advanced Reproductive Biotechnologies on 2013 and 2015

Training Course on Advanced Reproductive Biotechnology for livestock genetic improvement and research opportunities. May 25-June 12, 2015
Thank you very much for your attention