



## Chapter 21

# Critical Factors for Technology Transfer in Cattle Production: A Review


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### ABSTRACT

*Cattle production plays an important role in economic development and food security. Developed countries have achieved optimum levels of production through the implementation of technologies that have allowed efficient use of resources. In contrast, in the developing countries, despite their suitable means of production, such as large tracts of land dedicated to livestock, and programs of nutrition and health, farmers have not widely adopted reproductive and productive supplementation. Therefore, this chapter explores the main critical factors that limit the transfer of technology in bovine production systems, analyzing the interaction between the models, actors, and means of production.*

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## INTRODUCTION

Technology transfer is an instrument that contributes to economic growth of countries, and is defined as a set of skills, innovations, and practices that are transferred from the places of their creation to places where they are used daily. On the other hand, adoption refers to technologies that producers incorporate into a production process (Adejuwon, Ilori, & Taiwo, 2016; Zhang, Guo, Zhang, Han, & Zhang, 2016).

Low production efficiency is one of the principal challenges of livestock production units in developing countries. This decline results in producers' low incomes, and limits adoption and use of technologies (Senra, 2011; Zhang et al., 2016). Insufficient implementation of technologies related to improving breeding, nutrition, and health (Wade, 2016) affects reproductive performance of the herd, leading to calving interval of 507 days and a decrease in milk production of 7,031 kg/ year (Inchaisri, Jorritsma, Vos, Van der Weijden, & Hogeveen, 2010). In this way, economic performance of cattle farms is affected by up to 90%, occasioning reduced profits and increased production costs (Alves et al., 2015; Derks, Hogeveen, Kooistra, van Werven, & Tauer, 2014).

Technology transfer has played a key role in developed countries. Through its continuous use, it has been possible to improve productive processes, increasing milk and meat production, and achieve long-term economic progress (LeBel, 2008; Suárez, Aranda, & Palma, 2012). The inclusion of strategies and policies supported by science, technology, and innovation has allowed competitiveness in domestic and international markets (Şener & Sarıdoğan, 2011). An example of this is the dairy industry in the United States, which achieved a structural change in their productive system through the adoption of new technologies and management practices (Khanal, Gillespie, & MacDonald, 2010). Therefore, the objective of this review was to identify the main critical factors that limit the transfer of technology in bovine production systems, analyzing the interaction between models, actors, and the means of production.

## BACKGROUND

### **Dynamics Between Transfer Models and Main Actors in the Generation of Technologies**

Technology transfer is defined as how technological advances scientists develop are disseminated in private industry, which adopts them to produce useful products or services for commercial purposes. Technology transfer is mainly carried out by academic institutions, which generate scientific and technical knowledge. It is disseminated mainly by the following models:

- **Linear:** This model is based on the close relationship of three main components:
  1. **Researchers:** Who generate knowledge.
  2. **Extensionists:** Who transfer this knowledge.
  3. **Producers:** Who make the decision to adopt, or not, such knowledge. However, the model conceives that all producers in a given area have the same need for a solution to the similar problem. It is necessary to include, comprehensively, social participation for the development of technologies (Rodríguez et al., 2009).

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