

SANITARY SAFETY IN THE TRADE OF BOVINE EMBRYOS: RISKS AND PREVENTION

BIBLIOGRAPHIC REVIEW



OBJECTIVES

This bibliographic study aims to present the trends in global bovine embryo trade and, above all, to identify the health risks of this practice and the protocols currently applied to prevent the transmission of diseases through bovine embryos produced in vitro and in vivo.

INTERNATIONAL TRADE OF BOVINE EMBRYOS

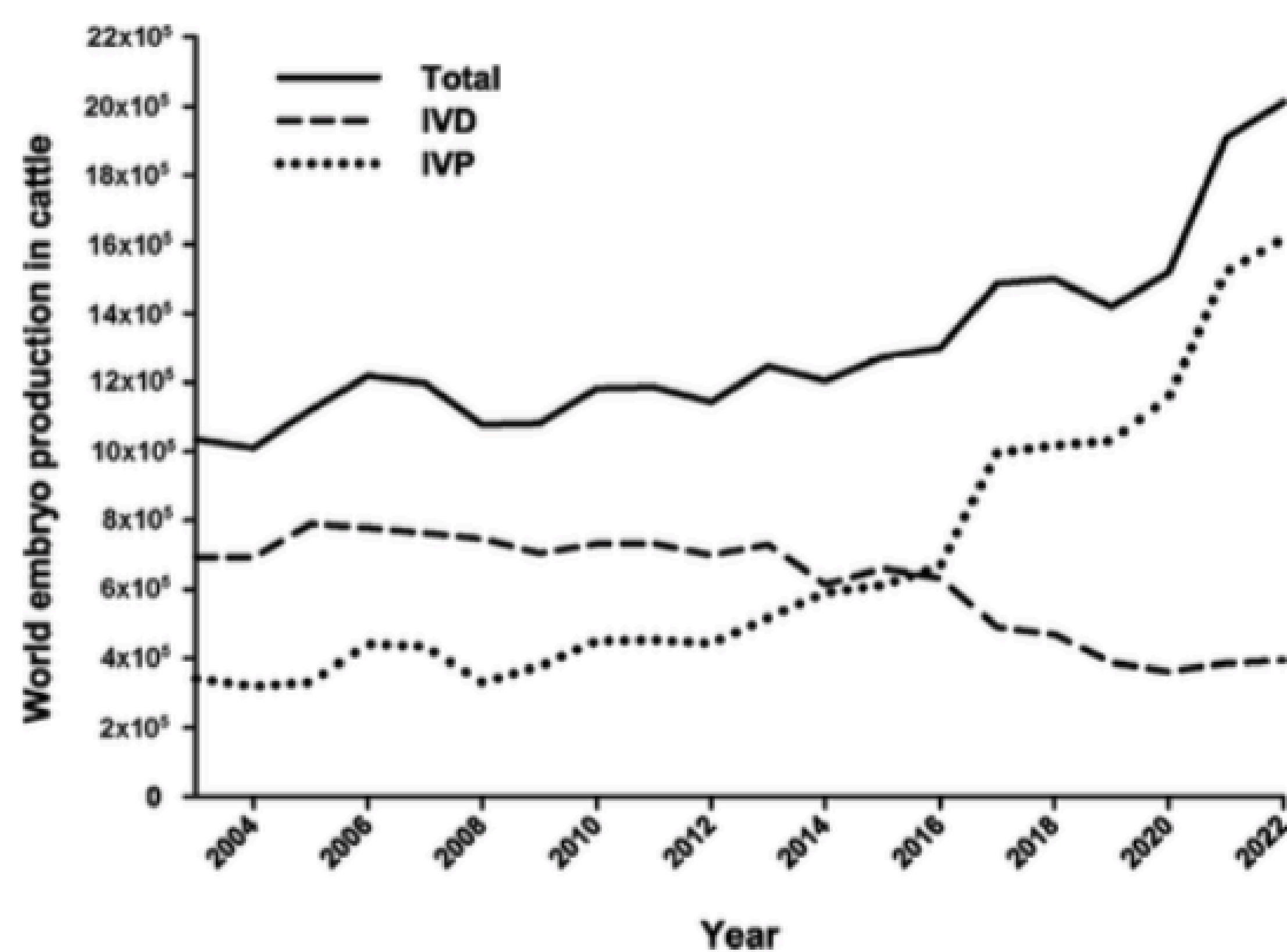


Figure 1. Number of bovine embryos (produced in vivo (IVD), produced in vitro (IVP), and total) registered during the period 2003-2022 (Mastromonaco, 2023).

The main producers can be summarized in 3 countries, together representing more than 75% of the world production, these are: United States (47%), Brazil (24%), and Argentina (5%).

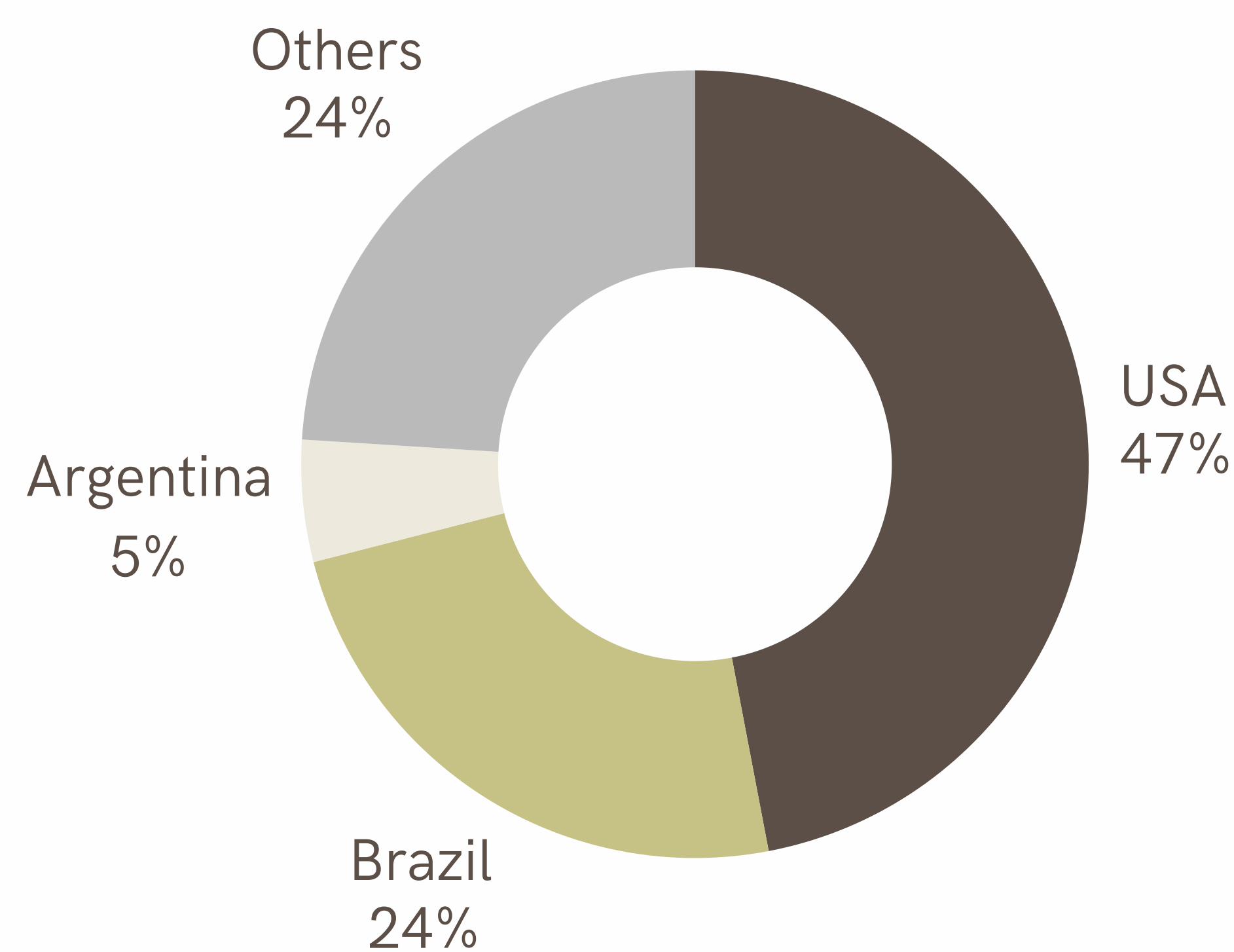


Figure 2. Main producers of bovine embryo in the world.

RISKS

CLASSIFICATION OF DISEASES ACCORDING TO TRANSMISSION RISK:

Category 1

Bluetongue, bovine spongiform encephalopathy, Brucella abortus, enzootic bovine leukosis, foot-and-mouth disease, and infectious bovine rhinotracheitis.

Category 2

N/A

Category 3

Bovine immunodeficiency virus, bovine viral diarrhea virus, Haemophilus somnus, Mycobacterium paratuberculosis, Neospora caninum and rinderpest.

Category 4

Bovine anaplasmosis, Chlamydia psittaci, lumpy skin disease, enterovirus, Escherichia coli, vesicular stomatitis, Coxiella burnetii, herpesvirus 4, Leptospira borgpetersenii, Mycobacterium bovis, Tritrichomonas foetus, Mycoplasma, Akabane virus, and parainfluenza-3 virus.

PREVENTION

Protocols for embryos

Three phases determining the final risk level:

- Risk of infection or contamination of embryos: depends on the animal health status of the exporting country, the health status of the donor females, and the characteristics of the specific pathogens.
- Risk reduction through embryo treatment procedures:
 - Wash embryos a minimum of 10 times with 1/100 dilutions.
 - Only wash embryos together if they are from the same female or batch.
 - Use trypsin washes when necessary.
 - Examine at 50x magnification to ensure the zona pellucida is intact and free of adherent material.
 - All shipped embryos must be accompanied by a declaration signed by the responsible veterinarian.
- Risk Reduction from monitoring donor animals and their herds: monitor after oocyte or embryo collection, considering the normal incubation periods of diseases to retrospectively determine health status while the embryos are stored in the exporting country.

CONCLUSIONS

- The trade of bovine embryos plays a fundamental role in the genetic improvement of the global livestock industry, leading to sustained growth in this sector.
- USA leads in the production and exportation of bovine embryos worldwide, as well as in vitro-produced embryos, which continue to increase in proportion to in vivo ones.
- The growth requires strict biosecurity measures to prevent disease transmission. Detailed protocols for handling semen, embryos, and certifying donor animals are vital for maintaining the health integrity of embryo trade.

References:

- Mastromonaco, G. (Ed.). (2023). Embryo Technology Newsletter (Vol. 41, Número 4). International Embryo Technology Society.
- Drost, M. (1980). Blastocist.