RPSC FSO eBook Index

Chapter 1: Salient features of agriculture with special reference to Rajasthan. Soil Fertility and Management of Problematic Soils in Rajasthan. Introduction to Dry land Farming and Agro-forestry. Introductory knowledge about Production Techniques of important field crops (Wheat, Mustard, Groundnut, Pulses, Bajra, Maize). Horticultural crops (Citrus, Mango, Guava, Ber, Onion, Tomato, Cucurbits, Chilli, Rose etc.) Spices and Medicinal crops (Cumin, Fenugreek, Fennel, Coriander, Isabgol, Aloevera, etc.) Important diseases and Pests of major Crops and their Management. Importance of agriculture marketing. General awareness about Seed science and Crop Physiology.


Chapter 3: Economy of Rajasthan : Major Minerals-Metallic & Non-Metallic; Power Resources- Renewable and Non Renewable; Major agro based industries-Textile, Sugar, Paper & Vegetable oil; Poverty and Unemployment; Agro food parks.

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Chapter 5: Visual Art of Rajasthan - Architecture of forts and temples of Rajasthan; Sculpture traditions of Rajasthan and various schools of painting of Rajasthan. Performing Art of Rajasthan - Folk music and musical instruments of Rajasthan; folk dance and folk drama of Rajasthan.

Chapter 6: Various religious cults, saints and folk deities of Rajasthan. Various dialects and its distribution in Rajasthan; literature of Rajasthani language.

Chapter 7: Geography of Rajasthan: Broad physical features- Mountains, Plateaus, Plains & Desert; Major rivers and lakes; Climate and Agro-climatic regions; Major soil types and distribution; Major forest types and distribution; Demographic characteristics; Desertification, Droughts & Floods, Deforestation, Environmental Pollution and Ecological Concerns.

Chapter 9: Present status of Food Technology in India and Rajasthan. General methods of food preservation and food processing. Importance of Post harvest technology of fruits and vegetables. Technology for processed products like Squash, Jelly, Sauce, Pickles etc. Post harvest Physiology and handling of fruits and vegetables. Types and functions of Packaging materials used in fresh and processed food. Food laws - brief review of regulatory status in India (FPO, Prevention of Food adulteration Act, Food Safety and Standard Act, Testing Food for its Safety, AGMARK). Hygiene and Sanitation (HACCP, Good Manufacturing Practices, Good Laboratory Practices etc.)

Chapter 10: Indian and International Food Laws (An Overview)

Food Safety and Standards Act of India, 2006: Provision, definitions and different sections of the Act and implementation, FSS Rules and Regulations, Overview of other relevant national bodies (e.g. APEDA, BIS, EIC, MPEDA, Spice Board etc.), International Food Control Systems/Laws, Regulations and Standards/Guidelines with regard to Food Safety – (i) Overview of CODEX Alimentarius Commission (History, Members, Standard setting and Advisory mechanisms: JECFA, JEMRA JMPR): WTO agreements (SPS/TBT), Important national and international accreditation bodies

Chapter 11: FSSAI - Role, Functions, Initiatives (A General Understanding)

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Chapter 12: Principles of Food Preservation, Processing and Packaging

Food Processing Operations, Principles, Good Manufacturing Practices, Overview of food preservation methods and their underlying principles including novel and emerging methods/principles, Overview of food packaging methods and principles including novel packaging materials/techniques

Chapter 13: Principles and Basics of Food Chemistry and their role in Human Nutrition
Structure and functions of macro-and micro nutrients, Role of macro and micronutrients in human nutrition, Overview of food additives with respect to their technological functions, Overview of anti-nutritional factors and their removal from foods, Overview of enzymes as food processing aids, Overview of nutraceuticals and functions foods, Overview of food contaminants and adulterants and their effects on human health, Food allergens and allergen city, Importance of diet in alleviating health risks, especially non-communicable diseases

Chapter 14: Food Microbiology & General principles of Food Hygiene

General principles of food microbiology and overview of food borne pathogens, Overview of sources of microorganisms in food chain (raw materials, water, air, equipment etc.) and microbiological quality of foods, Microbial food spoilage and Food borne diseases, General principles and techniques in microbiological examination of foods, Overview of beneficial microorganisms and their role in food processing and human nutrition, General principles of food safety management systems including traceability and recall – sanitation, HACCP, Good production and processing practices (GMP, GAP, GHP, GLP, BAP, etc)

Chapter 15: General concepts of Food Analysis and Testing

Fundamentals of field level and laboratory sampling with reference to importance of statistical tools, Overview of basic/classical methods of food analysis, Overview of modern analytical techniques including mass spectrometry and molecular techniques, Principles of Quality assurance and Quality control with reference to food analysis and testing.

Chapter 16: 1500 MCQs

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World's First Ever Food Safety Day

World Food Safety Day: The first ever World Food Safety Day (WFSD) celebrated on 7 June 2019 to draw attention and inspire action to help prevent, detect and manage foodborne risks, contributing to food security, human health, economic prosperity, agriculture, market access, tourism and sustainable development. Everyone has the right to safe, nutritious and sufficient food. Still today, almost one in ten people in the world fall ill after eating contaminated food. When food is not safe, children cannot learn, adults cannot work. Human development cannot take place.

Safe food is critical to promoting health and ending hunger, two of the primary goals of the 2030 Agenda. There is no food security without food safety and in a world where the food supply chain has become more complex, any adverse food safety incident may have global negative effects on public health, trade and the economy.

Yet food safety is taken for granted. It is often invisible until you get food poisoning. Unsafe food containing harmful bacteria, viruses, parasites or chemical substances, causes more than 200 diseases – ranging from diarrhea to cancer.

This international day is an opportunity to strengthen efforts to ensure that the food we eat is safe. Whether you produce, process, sell or prepare food, then you have a role in keeping it safe. Everybody along the food chain is responsible for food safety.

For this inaugural WFSD all stakeholders are invited to raise global awareness about food safety in general and to highlight that everyone involved in food systems has a part to play.

This year WFSD reinforces the call to strengthen commitment to scale up food safety made by the Addis Ababa Conference and the Geneva Forum under the umbrella of “The Future of Food Safety” in 2019.

To combat ongoing changes in climate, global food production and supply systems that affect consumers, industry and the planet itself, everyone needs to consider food safety now and tomorrow.

On 20 December 2018 the United Nations General Assembly adopted resolution 73/250 proclaiming a World Food Safety Day. Starting in 2019, every 7 June will be a time to celebrate the myriad benefits of safe food.

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Facts and figures:

- An estimated 600 million – almost 1 in 10 people in the world – fall ill after eating contaminated food and 420,000 die every year.
- Children under 5 years of age carry 40 percent of the foodborne disease burden, with 125,000 deaths every year.
- Foodborne illnesses are usually infectious or toxic in nature and caused by bacteria, viruses, parasites or chemical substances entering the body through contaminated food or water.
- Foodborne diseases impede socioeconomic development by straining health care systems, and harming national economies, tourism and trade.
- The value of trade in food is US$ 1.6 trillion, which is approximately 10 percent of total annual trade globally.
- Recent estimates indicate that the impact of unsafe food costs low- and middle-income economies around US$ 95 billion in lost productivity each year.
- Safe food is critical, not only to better health and food security, but also for livelihoods, economic development, trade and the international reputation of every country.
- Climate change is associated with altered geographic occurrence and prevalence of food safety hazards.
- Each year, an estimated 700,000 people die around the globe because of antimicrobial resistant infections.
- Improving hygiene practices in the food and agricultural sectors helps to reduce the emergence and spread of antimicrobial resistance along the food chain and in the environment.
- Better data is needed to understand the far-reaching impacts of unsafe food.
- Investment in consumer food safety education has the potential to reduce foodborne disease and return savings of up to ten-fold for each dollar invested.

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Food Standards Acronyms & Abbreviations

ADR-Adverse drug reaction
AFDO-Association of Food and Drug Officials
AMRH-African Medicines Regulatory Harmonization
Anvisa-National Health Surveillance Agency (Brazil)
AOAC-Association of Official Analytic Communities
APEC-Asia Pacific Economic Cooperation
APEDA-Agricultural and Processed Food Products Export Authority
API-Active pharmaceutical ingredient
ASEAN-Association of Southeast Asian Nations
AUIBAR-African Union Interafrican Bureau for Animal Resources
BIO-Biotechnology Industry Organization
CDC-Centers for Disease Control and Prevention
CDSCO-Central Drugs Standard Control Organization (India)
CFSAN-Center for Food Safety and Applied Nutrition
COE-Centers of Excellence
CPSI-Center for Science in the Public Interest
CRADA-Cooperative Research and Development Agreement
DHS-Department of Homeland Security
DNA-Deoxyribonucleic acid
DOE-Department of Energy
DOJ-Department of Justice
EQM-European Directorate for the Quality of Medicines and Healthcare
EFSA-European Food Safety Authority
EIC-Export Inspection Council of India
EMA-European Medicines Agency
EPA-Environmental Protection Agency
EU-European Union
EURASFF-European Union’s Rapid Alert Systems for Food and Feed
FAO-Food and Agriculture Organization of the United Nations
FBI-Federal Bureau of Investigation
FDA-Food and Drug Administration
FIAE-Food Industry Association Executives
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FICCI-Federation of Indian Chambers of Commerce and Industry
FSMA-FDA Food Safety Modernization Act
FSSAI-Food Safety and Standards Authority of India
G20-The Group of 20
GAO-Government Accountability Office
GAP-Good Agricultural Practices
GHTF-Global Harmonization Task Force
GIZ-Gesellschaft für Internationale Zusammenarbeit (Society for International Cooperation)
GMP-Good Manufacturing Practices
GPhA-Generic Pharmaceutical Association
HACCP-Hazard Analysis and Critical Control Points
HIV-human immunodeficiency virus
HPV-human papillomavirus
HS-Harmonized System Codes
IAEA-International Atomic Energy Agency
IANPHI-International Association of National Public Health Institutes
IBA-International Biopharmaceutical Association
ICDRA-International Conference of Drug Regulatory Authorities
ICH-International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use
ICMSF-International Commission on Microbiological Specifications for Food
IICA-Inter-American Institute for Cooperation on Agriculture
IPPC-International Plant Protection Convention
ISO-International Organisation for Standardization
MCC-Medicines Control Council of South Africa
MDMA-Medical Device Manufacturers Association
MRA-Medicines Regulatory Authority
NEPAD-New Partnership for Africa’s Development
NMRA-National Medicines Regulatory Authority
OECD-Organisation for Economic Co-operation and Development
OIE-World Organisation for Animal Health
PAHO-Pan American Health Organization
PhRMA-Pharmaceutical Research and Manufacturers of America

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PREDICT-Predictive Risk-based Evaluation for Dynamic Import Compliance Targeting
SEAICRN-Southeast Asia Infectious Disease Clinical Research Network
SFDA-State Food and Drug Administration (China)
SIT-sterile insect technique
SPPA-Strategic Partnership Program Agroterrorism
SPS-Sanitary and Phytosanitary Measures
SPS-Strengthening Pharmaceutical Systems
SRA-Stringent Regulatory Authority
TBT-Technical Barriers to Trade
TRIPS-Trade Related Aspects of Intellectual Property Rights
UN-United Nations
UNICEF-United Nations Children’s Fund
UNIDO-United Nations Industrial Development Organization
USAID-United States Agency for International Development
USDA-United States Department of Agriculture
USP-United States Pharmacopeia
USTR-United States Trade Representative
WHO-World Health Organization
WTO-World Trade Organization

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Chapter 1: Agriculture of Rajasthan

Rajasthan at a Glance

State- Rajasthan (Land of Kings)
Capital- Jaipur
Largest City- Jaipur
Governor- Kalraj Mishra
Chief Minister- Ashok Gehlot (Congress)
Deputy Chief Minister- Sachin Pilot (Congress)
Total Number of Districts- 33
MLA- 200
MP-25
Rajya Sabha Seats- 10
Lok Sabha Seats- 25
Total Area- 342239 Km Sq.
Area Rank- 1st in Country
Total Population- 68,548,437
Population Rank- 7th in Country
GDP (2018-19)- ₹9.24 lakh crore (US$130 billion)
Official Language- Hindi
Symbols of Rajasthan
Dance- Ghoomar
Animal- Camel & Chinkara
Bird- Godawan

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Rajasthan in Scenario of India

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<tr>
<th>S. No.</th>
<th>Item</th>
<th>India</th>
<th>Rajasthan</th>
<th>% Share</th>
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<td>Population (Lakhs) 2011</td>
<td>12108.55</td>
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<td>3</td>
<td>% of SC Population to Total Population 2011</td>
<td>16.60</td>
<td>17.80</td>
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<tr>
<td>4</td>
<td>% of ST Population to Total Population 2011</td>
<td>8.60</td>
<td>13.50</td>
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<td>5</td>
<td>Literacy Percentage Year 2011</td>
<td>73.00</td>
<td>66.10</td>
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<tr>
<td>6</td>
<td>Workers (Crores)</td>
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<tr>
<td>A</td>
<td>Cultivators</td>
<td>11.88</td>
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<td>11.46</td>
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<td>Agri. Labourers</td>
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<td>Male Agri. Labourers</td>
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<td>B2</td>
<td>Female Agri. Labourers</td>
<td>6.16</td>
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<td>House Hold Industry Workers</td>
<td>1.83</td>
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<td>D</td>
<td>Other Workers</td>
<td>20.04</td>
<td>1.06</td>
<td>5.29</td>
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<td>Land Use Statistics 2013-14 (000 hec.)</td>
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a. Geographical Area (ooo hec.) 328726 34224 10.41
b. Reporting Area for Land Utilization Statistics (ooo hec.) 307796 34267 11.13
c. Forest 71828 2758 3.84
d. Land Not Available for Cultivation 43860 4274 9.74
e. Other Uncultivated Land Excluding Fallow Land 25832 5718 22.14
f. Fallow Land 24848 3250 13.08
g. Net Area Sown 141428 18268 12.92
h. Total Cropped Area 200859 26120 13.00
i. Cropping Intensity 142 143
j. Agri. Land/Cultivable Land 181850 25542 14.05

Population of Rajasthan

<table>
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<th>S.No.</th>
<th>Particulars</th>
<th>2011 #</th>
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<tr>
<td>1</td>
<td>Total Population (in Lacs.)</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td>(i) Rural</td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>(ii) Urban</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Female</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>
### Introduction:

Agriculture plays a vital role in India’s economy. 54.6% of the population is engaged in agriculture and allied activities (census 2011) and it contributes 17.4% to the country’s Gross Value Added for the year 2016-17 (at current prices). Given the importance of agriculture sector, Government of India took several steps for its sustainable development. Steps have been taken to improve soil fertility on a sustainable basis through the soil health card scheme, to provide improved access to irrigation and enhanced water efficiency through Pradhan Mantri Krishi Sinchai Yojana (PMKSY), to support organic farming through Paramparagat Krishi Vikas Yojana (PKVY) and to support for creation of a unified national agriculture market to boost the income of farmers. Further, to mitigate risk in agriculture sector a new scheme “Pradhan Mantri Fasal Bima Yojana (PMFBY) has been launched for implementation from Kharif 2016.

As per the land use statistics 2014-15, total geographical area of the country is 328.7 million hectares, of which reported net sown area is 140.1 million hectares and the gross cropped area is 198.4 million hectares with a cropping intensity of 142 percent. The net area sown works out to be 43 percent of the total geographical area. The net irrigated area is 68.4 million hectares.

### Crop Production Seasons:

Crop production practices are of utmost importance for successful and economic cultivation of field crops and national food security at large. Current agriculture direly needs scientific and rational crop production practices to enhance farm productivity with long-term sustainability. Crop production practices can be divided into various categories that farmers make to produce food, fodder and fiber, etc. The major ones are:
Soil and crop management: It deals with deciding what crops and varieties to grow and in what sequence to utilize the soil’s productive capacity, and what tillage, cultivation, and soil conservation measures to undertake to physically till and preserve the soil and conserve moisture in a particular agro-ecology.

Nutrient management: It deals with determining the additional nutrients the soil needs for crop growth, and applying agricultural resources, animal manure, compost, or commercial fertilizers in appropriate forms, amounts, and ways that foster crop yields and farm profitability, while reducing nutrient loss to the environment.

Water management: It deals with determining the water needed for crop growth and applying that water efficiently, considering water availability, drainage, and offsite water quantity/quality impacts.

Weed management: It deals with determining the weed threats to crop growth, yield, and quality and the management practices to control them in field crops.

Pest management: It deals with determining insect-pest and disease threats to crop growth, yield, and quality and the preventive or remedial measures to control them besides keeping the food and environmental safety.

Crop Production Seasons

Primarily, there are three crop production seasons in India viz. Kharif, Rabi and Zaid.

Kharif season crops: The Kharif crop is the summer crop or monsoon crop in India. Kharif crops are usually sown with the beginning of the first rains in June-July, during the south-west monsoon season. Major Kharif crops of India include: rice, maize, sorghum, mungbean, groundnut, cotton, soybean, etc.

Rabi season crops: The Rabi crop is the winter season crop in India. It is sown in October-November and harvested in March-April every year. Major Rabi crops in India include: wheat, barley, oats, mustard, peas, etc.
**Zaid season crops:** This crop is grown in some parts of the country during March to June. Major Zaid crops in India include: frenchbean, muskmelon, watermelon, bittergourd, pumpkin, ridgegourd, etc.

**Classification of Agricultural Crops:**

- **Cereal crops:** Rice, wheat, maize, sorghum.
- **Pulse crops:** Pigeonpea, urdbean, mungbean, kidneybean, cowpea, chickpea, lentil, pea, etc.
- **Oilseed crops:** Soybean, rapeseed & mustard, groundnut, sunflower, sesame, safflower, etc.
- **Fodder crops:** Berseem, red clover, lucerne, etc.
- **Fibre crops:** Cotton, jute, mesta, etc.
- **Commercial crops:** Sugarcane, tea, coffee, etc

**Agriculture in Rajasthan**

Rajasthan is an agrarian state, where around 80 percent of the total population resides in rural area and largely dependent on agriculture as the source of their livelihood. According to Census 2011, agriculture sector provided employment to 62% of total workers of the state. Besides around 22.5% of state’s GDP comes from agriculture.

Rajasthan has cultivated area of almost 20 million hectares but due to some unavoidable circumstances, only 20% of the total cultivated area is irrigated as a major portion of the state is parched and infertile. The weather of Rajasthan is arid and hot. Because of extreme weather, droughts are common in Rajasthan and the state has experienced some severe drought in last few decades.

Rivers from Punjab, Narmada River in south, Agra canals from Haryana & Uttar Pradesh are the water providing sources to the dry land.

**Agriculture Production in Rajasthan**

Rajasthan is the highest producer of Mustard, Gram & Bajra in the Country. Rajasthan is the largest producer of Bajra in India-42.41%, wheat jowar, maize, cotton, rape-seed and mustard (largest producer with 46.46%),
Groundnut (2\textsuperscript{nd} largest producer with 15.08\%), Soyabean (3\textsuperscript{rd} largest producer with 8.21\%), Gram (3\textsuperscript{rd} largest producer with 14.92\%), Total pulses (3\textsuperscript{rd} largest producer with 13.32\%), spices, groundnut & horticultural crops. #(As per the data-2016-17)#

As per preliminary forecast for the year 2018-19, the total food grain production in the State is expected to be 218.29 lakh tonnes which is a decrease of 1.36 per cent as compared to production of 221.30 lakh tonnes for the previous year. While Kharif output is projected to increase by 4.13 per cent, the Rabi output is expected to decrease by 4.54 per cent. (Fig: Given Below)

The major crops of Rajasthan can be categorized in two types:

1. Rabi Crops
2. Kharif Crops

1. **Rabi Crops:** These are also known as winter crops and are mainly depends on ground water irrigation. Rabi crops are cultivated in the months of October-November and are harvested in the month of March-April. The crops sown during Rabi season are barley, wheat, gram, pulses and oil seeds(mainly rapeseed and mustard).

2. **Kharif Crops:** These are also known as rain-fed crops and are sown in the month of June-July and harvested in the months of September-October. The crops sown during Kharif season are bajra, some pulses, maize, ground nut & jowar.
Classification of Crops in Rajasthan

<table>
<thead>
<tr>
<th>Crop</th>
<th>Major Producing Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>Jaipur, Alwar, Bharatpur, Kota, Bundi, Chittorgarh, Bhilwara, Sawai Madhopur, Sri Ganganagar &amp; Udaipur</td>
</tr>
<tr>
<td>Maize</td>
<td>Bhilwara, Udaipur, Chittorgarh, Banswara, Rajsamand &amp; Jhalawar</td>
</tr>
<tr>
<td>Gram</td>
<td>Jaipur, Sri Ganganagar, Bundi, Kota, Churu, Baran, Bhilwara, Sawai Madhopur</td>
</tr>
<tr>
<td>Jowar</td>
<td>Kota, Ajmer, Tonk, Baran, Bundi, Jhalawar, Sawai Madhopur, Chittorgarh</td>
</tr>
<tr>
<td>Bajra</td>
<td>Jodhpur, Jalore, Alwar, Sikar, Nagaur, Churu, Barmer, Jhunjhunu, Sawai Madhopur</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>Chittorgarh, Sri Ganganagar, Udaipur, Kota, Bundi, Rajsamand</td>
</tr>
<tr>
<td>Mustard</td>
<td>Sri Ganganagar, Alwar, Bharatpur, Jaipur, Sawai Madhopur, Jalore, Nagaur, Pali, Kota</td>
</tr>
<tr>
<td>Cotton</td>
<td>Chittorgarh, Udaipur, Banswara</td>
</tr>
<tr>
<td>Soyabean</td>
<td>Chittorgarh, Kota, Bundi, Jhalawar, Baran</td>
</tr>
<tr>
<td>Groundnut</td>
<td>Chittorgarh, Jaipur, Sawai Madhopur, Tonk, Dausa</td>
</tr>
</tbody>
</table>
### Sesamum
Jodhpur, Jalore, Nagaur, Pali, Ajmer

### Tobacco
Jaipur, Alwar, Jhunjhunu & Sirohi

### Red Chilli
Alwar, Sawai Madhopur, Bhilwara, Tonk, Jodhpur, Jaipur

### Jeera
Jalore, Ajmer, Pali, Sirohi, Barmer, Nagaur

### Black Pepper
Jodhpur, Nagaur, Barmer

### Isabgol
Barmer, Jalore, Sirohi

### Opium
Chittorgarh, Baran, Banswara, Bundi, Bhilwara, Jhalawar, Kota

## Agro Climate Zones of Rajasthan

The entire country has been delineated into 126 agro-climatic zones by the Indian Council of Agricultural Research (ICAR). Similarly, Rajasthan has been divided into 10 agro-climatic zones. These zones have been classified on the basis of agro-climatic parameters like rainfall, temperature regime, topography, soil characteristics, cropping pattern and irrigation availability. The Agro-climatic zones of Rajasthan are as follows:

1. Arid North Western Sandy Plain
2. Irrigated North Western Plain
3. Hyper Arid Partial Irrigated Zone
4. Transitional Plain of Inland Drainage
5. Alluvial Plain of Luni Basin
6. Semi Arid Eastern Plain
7. Flood Prone Eastern Plain
8. Sub Humid Southern Plain and Aravallis
9. Humid Southern Plain
10. Humid South Eastern Plain

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Chapter 2: Importance of Livestock in Economy of Rajasthan

Significance of livestock and poultry in Indian economy-
Livestock and Poultry Production
Livestock farming is an integral part of crop farming and contributes substantially to household nutritional security and poverty alleviation through increased household income. The returns from livestock especially dairying and mixed farming in small and medium holdings are larger and highly sustainable. The progress in this sector results in more balanced development of the rural economy and improvement in economic status of poor people associated with livestock. Indian agriculture is an economic symbiosis of crop and livestock production with cattle as the foundation. Dairy animals produce milk by converting the crop residues and by products from crops which otherwise would be wasted. Dairy sector contributes by way of cash income, draught power and manure. Livestock provides for human needs by way of
It is a living bank providing flexible finance in time of emergencies and also serves as insurance against crop failure for survival. If Agriculture is the foundation of our national economy Animal husbandry constitutes the sheet anchor of agriculture. Indian agriculture marches on the patient back of the bullock. 70 percent of the livestock are owned by 67 percent of small and marginal farmers. 76 percent of the milk is produced by weaker sections of society. One fifth of the world’s livestock population is present in India. India has nearly 57 % of the world’s buffalo population, 16% of the cattle population, 20% of goat population and 5 % of sheep population although India constitutes less than 3 % of the world’s total land area.

Importance of livestock in Economy of Rajasthan:

Livestock industry is important for increasing productivity in agriculture sector. Among the Indian livestock based vocations, poultry farming occupies a pivotal position due to its enormous potential to bring about rapid economic growth with low investment. Poultry industry contributes about Rs. 400 billion accounting for about 0.7 per cent of the national GDP and about 10% of the Livestock GDP. In livestock 65 per cent is contributed by
meat product, 22.5 per cent by dairy product and 12.5 per cent by poultry product. Dependable research indicates that in India with every egg consumed per capita, there is a potential for 25,000 more jobs. Similarly, with every 50 grams of poultry meat consumed per capita, there is a potential to create 20,000 additional jobs and if a growth rate of 10 per cent in egg production and 15 per cent in broiler production can be sustained for the next 10 years, the per capita consumption of egg will increase to 140 and per capita consumption of meat to 9.70 kilograms. The contribution to GNP will be 12,0000 crores and the employment generated will go up to 10 million. Sluis & van der (2003) showed that it is reported that despite the fact that India’s poultry industry is the fastest growing in the world; the sector's potential to attract big-time foreign investment is negligible and will necessitate a host of changes, including greater integration, better cost-efficiencies and improvement in distribution. Value of output from livestock was 388370 crore in 2010-11 in which sharing of eggs was 15123 crore and poultry meat was 30293 crore, respectively. (National accounts division, CSO, M/O statistic and programme implementation). The organised sector of Indian poultry industry contributes nearly 70% of the total output whereas the rest emanates from the unorganized sector. In Rajasthan, Jaipur district is the second in organized poultry farms in Rajasthan. The major components in the costing sense involved in poultry industry are feed, veterinary, day old chick, transportation etc. and other fixed costs.

METHODOLOGY
For the present study, the Jaipur district was purposely selected as it has second rank under number of organized poultry farms among all the districts of Rajasthan. Further, there were 200 poultry farms in Jaipur district. A ten percent size of sample that is 20 out of 200 farms was selected randomly. Farms different birds sizes were taken randomly. Both primary and secondary data were collected for the study. The primary data for the study from all 20 poultry farms were collected by interviewing the farmers personally and from the records maintained by them with the help of preprepared schedules. Secondary data were collected from various sources like Respective balance sheets of poultry farms, The National Egg Coordination committee and poultry training institute, Different publications, Directorate of animal husbandry, Jaipur etc. Data were collected from August 2013 to January 2014.
RESULT AND DISCUSSION
Poultry farms which were taken for the analysis i.e. 20 farms out of 200 organized farms. Three consecutive year 2012-13, 2011-12, 2010-11 with the different bird size have been analyzed in the manner of investment and output to depict the scenario of investment in the poultry industry in the Jaipur district of Rajasthan. The Bird size was different from each other and has been categorized in Small, Medium and Large with the bird numbers less than 5000, 5000-10000 and more than 10000, respectively.

Introduction: Importance of Livestock and Poultry in Indian Agricultural livestock and poultry census and its role in Indian Economy.

1. India owns nearly 23% of the world livestock population.

2. Agricultural is the back bone of Indian Economy and within agriculture livestock plays an importance role in providing sustainable income to farmers throughout the year.

3. Failure of monsoon, pest infestation, floods etc – when crop husbandry fails next alternate is livestock and poultry industry.

Animal Husbandry – important steps are -Breeding, Feeding, Weeding and Heeding

Importance of livestock in Agriculture

1. Income from livestock and poultry enterprises contribute as high as 10% of the total national income and nearly 50% of agricultural sector income.

2. Effective utilization of labour –
Family labour is effectively utilized in animal husbandry.

3. Soil fertility: organic manure –
promotes and maintain soil fertility.

4. Effective utilization-
Cow produces 8 tonnes of farm yard manure per year and farm biomass farm products which includes fodder, feed, edible weed, tree fodder, bund grass are better utilized – and converted to Edible products like – Milk, Meat and Egg.

5. Effective utilization of agri industrial by products

By products obtained from grain processing (bran), oil seed process (oil cakes), pulses processing (gram, husk) and molasses.


7. Inter relationship

Man, animal plant interrelation is interdependent (one cannot survive without the help of other) Man not only depends on plants and animals for food but also for income and other needs. He co-ordinates activities of the crop and other husbandry by proper planing.

**Main objectives of livestock census**

1. To assess the growth rate of the livestock
2. It helps to assess/improve the quality/production performance
3. It helps to reduce the uneconomical livestock by culling.

**Introduction of Artificial Insemination & its Methods:**

Artificial insemination is the technique in which semen with living sperms is collected from the male and introduced into female reproductive tract at proper time with the help of instruments. This has been found to result in a normal offspring. In this process, the semen is inseminated into the female by placing a portion of it either in a collected or diluted form into the cervix or uterus by mechanical methods at the proper time and under most hygienic conditions.

The first scientific research in artificial insemination of domestic animals was performed on dogs in 1780 by the Italian scientist, Lazanno Spalbantzani. His experiments proved that the fertilizing power reside in the spermatozoa and not in the liquid portion of semen. Few further studies under research
station conditions helped this technique to be used commercially all over the world including India.

Artificial insemination is not merely a novel method of bringing about impregnation in females. Instead, it is a powerful tool mostly employed for livestock improvement. In artificial insemination, the germplasm of the bulls of superior quality can be effectively utilized with the least regard for their location in faraway places. By adoption of artificial insemination, there would be considerable reduction in both genital and non-genital diseases in the farm stock.

Advantages of Artificial Insemination

There are several advantages by artificial insemination over natural mating or servicing.

- There is no need of maintenance of breeding bull for a herd; hence the cost of maintenance of breeding bull is saved.
- It prevents the spread of certain diseases and sterility due to genital diseases: contagious abortion, vibriosis.
- By regular examination of semen after collection and frequent checking on fertility make, early detection of interior males and better breeding efficiency is ensured.
- The progeny testing can be done at an early age.
- The semen of a desired size can be used even after the death of that particular sire.
- The semen collected can be taken to the urban areas or rural areas for insemination.
- It makes possible the mating of animals with great differences in size without injury to either of the animal.
- It is helpful to inseminate the animals that refuse to stand or accept the male at the time of oestrum.
- It helps in maintaining the accurate breeding and cawing records.
- It increases the rate of conception.
- Old, heavy and injured sires can be used.

Disadvantages of Artificial Insemination

- Requires well-trained operations and special equipment.
- Requires more time than natural services.
Improper cleaning of instruments and in sanitary conditions may lead to lower fertility.

If the bull is not properly tested, the spreading of genital diseases will be increased.

Necessitates the knowledge of the structure and function of reproduction on the part of operator.

**Insemination Methods**

There are different methods of insemination in different species of animals i.e. speculum method, vaginal method and recto vaginal method.

**Recto Vaginal Method**

In cattle the safe and best method of insemination is “Recto vaginal method of insemination”.

Cow which is in heat is well controlled placing it in a Travis.

The inseminator will get ready by wearing a plastic apron, gumboots and gloves.

The semen straw after thawing (keeping the semen straw in warm water for a minute to convert the freezed semen into liquid and the sperms become motile) is loaded in a sterile A.I. gun covered with a plastic sheath.

The inseminator will insert the gloved left hand into the rectum after applying the soft soap or other lubricant on the glove and back racked the animal, and the hand is further inserted and will catch hold the cervix through rectal wall.

The A.I gum loaded with semen straw is passed through the vulva to ‘vagina and cervix and observed with the hand in rectum that the A. I gum reaches the cervix, then the semen is deposited by injecting the gun, and after depositing the semen the gun is removed, the empty straw and sheath are disordered.

**Spectrum Method**

In this method, spectrum is placed in the vagina of the cow, which provides passage outside to the site of insemination, then inseminating tube is passed through the speculum and semen is deposited at the cervix.
Vaginal Method

Hand is passed through the vagina and the inseminating tube is guided by hand to the site of insemination and semen is deposited. Here there is a risk of contamination and injury of female genitalia.

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Chapter 3: Economy of Rajasthan

Highlights of Union Budget of Rajasthan 2019-20

Agriculture:
✓ Krishak Kalyan Kosh of Rs. 1000 crore for Ease of Doing Farming
✓ Zero Budget Natural Farming will be taken up in 36 Gram Panchayat of Banswara, Tonk and Sirohi at the cost of Rs. 10 crore, benefiting 20 thousand farmer
✓ Advance storage of 1 lac MT DAP and 2 lac MT Urea
✓ Krishi gyan Karyakram to sensitise farmers regarding better techniques, provision of Rs. 2 crore
✓ New policy for promoting agriculture processing, trade and export

Cooperative:
✓ Kisan Sewa Portal started since Feb., 2019, 50 lac farmers benefited
✓ Benefit of short term agriculture loan waiver by paying Rs. 6000 crore
✓ Short term agriculture loan of Rs. 9513 crore outstanding upto 30-11-2018 is waived, 20.46 lac farmers benefited, 1.10 lac beegha land de-mortgaged
✓ Target of Rs. 16000 crore short term agriculture loan waiver through Kendriya Sahkari Banks. Provision of Rs. 150 crore for grant
✓ Godown construction in 100 GSS and 20 KSS

Animal Husbandry:
✓ Total 1478 new sub-centers in five years, this year 400 new sub centers
✓ New Veterinary College at Jodhpur
✓ Nandi-shala at each Gram Panchayat

PWD:
✓ Expenditure of Rs. 35000 crore in next five years, provision of Rs. 6037 crore for this year
Connecting 1009 villages by Damar Roads in next 4 years with expenditure of Rs.1000 crore
Development of 435 km. of 6 state highways with expenditure of Rs.927 crore in Jaipur, Churu, Sriganganagar, Hanumangarh, Nagaur, Sikar, Bikaner and Bhilwara
Construction of 2 ROB and 32 RUBs
Renewal of 2394 km. roads with expenditure of Rs.250 crore under

PMGSY

Improvement and renewal of 2200 km. roads with expenditure of Rs.337 crore in tribal and desert rural areas and 2568 km. roads with Rs.463 crore in remaining other rural areas under NABARD scheme
Vikas Path at each gram panchayat, total 10000 km.
DPR of elevated road in Jodhpur

Energy:

6000 MW additional power generation by traditional sources in next 7 years
New solar energy policy and new wind energy policy
Establishment of 1426 MW wind energy and 4885 solar energy projects in 5 years
Establishment of 600 MW solar plants on unusable land of farmers
765 KV sub station in Jodhpur and phase wise establishment of three 220 KV, thirteen 132 KV sub station with expenditure of Rs.2338 crore
one lac new agriculture connection in 2019-20
Solar pump sets to farmers under Kusum scheme
Rs.5200 crore for establishment of feeders for agriculture connections in next four years
600 new transfers on 33 KV sub stations in 3 years, Rs.500 crore
Smart meters in city areas on 80000 distribution transfers

Water Resources and Command Area Development:

MoU for Rajasthan feeder and Sarhind feeder, total provision of Rs.1976.75 crore. Expenditure of Rs.220.37 crore in this year.
Provision of Rs.207 crore for राजस्थान जल क्षेत्र पुनसरंचना परियोजना

Renovation works of Rs.262.40 crore for 29 sub projects in 13 districts under राजस्थान जल क्षेत्र आजीविका सुधार परियोजना

Proposal of पुनर्वास एवं सुधार परियोजना for renovation of 211 large dams, total provision of Rs.965 crore

55 works of Rs.517 crore in 21 districts for development of irrigation facilities

Maintenance of 368 km. long canals in Sahid Birbal Branch System

Maintenance of 480 km. long canals in IGNP’s Datore, Nachna, Awai System

Irrigation facility for remaining 20000 hectare under Choudhary Kumbha Ram Lift Canal

PHED:

Provision of Rs.8445 for PHED

Phase wise solar DFU for 1250 villages/dhanies

Rs. 200 crore for solar tank with tube wells

390 villages will be connected by pipe lines in 4 years, commencing 25 works, total expenditure Rs.950 crore

5 projects in coming years in Barmer and Jhunjhunu districts with cost of 2918 crore

New project for 5 towns and 2104 villages of Jodhpur, Barmer, Pali under Rajiv Gandhi Lift Canal-III, total cost Rs.1454 crore

Drinking water project for 14 towns and 3072 villages of Alwar, Bharatpur, Dholpur under Chambal-Alwar drinking water project, cost Rs.4718 crore

Drinking water project from Isarda Dam for 5 towns and 124 villages of Dausa and Sawaimadhopur districts, cost Rs.3159 crore

Project for Ladnu, Kuchaman, Degana, Merta, Riya, Khinwsar, Mundwa and Nagaur panchayat samities from Nagaur Lift Project, 3.15 lac population of 1926 dhanies will be benefited

New project for drinking water of Bikaner City and nearby 32 villages
Project for Hindoli with cost of Rs.650 crore, Rs.15.50 crore for DPR
10 Gram Panchayats of Sojat Tehsil of Pali will be connected with Dantiwara IGNP water distribution tank of Jodhpur

**Industries:**
- New industry area in Jaipur, Jodhpur, Kota, Barmer, Bhilwara, Ajmer, Rajasmand, Sawai Madhopur, Dausa and Sirohi districts
- Establishment new CETPs and upgradation of existing ones

**MSME:**
- Interest subvention on loans upto Rs.10 crore in प्रधान मंत्री लघु उद्योग प्रोत्साहन परियोजना Rs.50 crore for this year, Rs.250 crore for five years
- Amount of revolving fund to Khadi Institutions increased to Rs.10 crore and tenure to 10 years

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