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RABBIT DATA FOR DEVELOPMENT (RD4D): CONCEPT, PROCESSES, OUTCOMES

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ABSTRACT

With the recent global upsurge in the application of data analytics tools in business and enterprise development, it becomes imperative to explore and deploy the same tools as a strategic intervention to promote rabbit enterprises for wealth creation. Actualizing this goal will require a mechanism for capturing and harnessing data analytics for sustainable meat rabbit enterprise and value chain development. The main objective of this presentation is to explore a strategy for the creation of a “Rabbit Data for Development” (RD4D) portal to facilitate the compilation, organization and dissemination of data analytics and insights -on all aspects of rabbit production and value chains - as a key strategy for meat rabbit enterprise development. Methodology describes a generalized architecture for RD4D that embodies databases and repositories with the capability to generate periodic analytics, insights and intelligence for stakeholders in the meat rabbit value chain. Expected outcomes include: (a) a framework for the dissemination of rabbit data analytics and intelligence for viable and sustainable meat rabbit enterprises, (b) a functional RD4D architecture for rabbit data warehousing with multiple databases and repositories, covering all activities in the meat rabbit value chain, and (c) decision support tools and systems to promote efficient meat rabbit production enterprises and value chains.

Key words: Rabbit Data Warehousing, Rabbit Value chains, Key performance indicators, Value creation

INTRODUCTION

Globally, there is a major upsurge in the application of “Big Data Analytics” in businesses and value creation in agriculture (Deloitte, 2018). Wolfert *et al* (2017) reported that the scope of big data applications in smart farming goes beyond primary production, noting that it is influencing the entire value chain. According to these authors, big data drives real-time operational decisions and re-designs business processes for game-changing business models.

Under this changing landscape, it becomes imperative that big data analytics and tools be deployed as part of a strategic intervention to promote rabbit enterprise and value chain development for income generation. With the proliferation of small- and medium-scale commercial meat rabbit holdings in sub-Saharan Africa (Colin and Lebas, 1996), there is the possibility of accumulating mega datasets from these holdings. Categories of core datasets that can be harnessed from these enterprises include: (a) data on input supply systems for rabbit enterprises (feeds and forage supply, healthcare, housing, genetics, breeding stocks, etc.), (b) key performance indicators on rabbit productivity, (c) data on meat rabbit products and value additions, (d) production environment descriptors (Scherf and Tixier-Boichard, 2009), (d) data on marketing, socio-economics, and gender roles (e.g. cost-benefit analysis for smallholder meat rabbit operations by Lukefahr

and Cheeke, 1990); (e) data on rabbit value chain actors and activities (Mutsami, 2019), and (f) metadata on all the categories above.

A key constraint however, is the dearth of a mechanism for harnessing these huge data assets for value creation for sustainable and viable rabbit enterprise development. Other constraints include absence of a proper framework for data capture and management from these afore-mentioned sources. Therefore, some key research questions would include the following: (a) What roles do big data play in promoting the viability of small- and medium-scale meat rabbit enterprises? (b) How can data intelligence be harnessed for sustainable meat rabbit enterprise development? (c) What are the critical data requirements for meat rabbit value chains? (d) Who are the critical stakeholders and how can they be mobilized and organized to harness data intelligence for enterprise development? (e) What are the expected benefits and risks under a new data paradigm and culture? The main objective of this paper is to explore a strategy for the creation of an information system to facilitate the compilation, organization and dissemination of data analytics and insights - on all aspects of meat rabbit production and value chains - as a key strategy for wealth creation. Target groups are small- and medium scale rabbit farmers and participants in the meat rabbit value chain.

MATERIALS AND METHODS

The entire methodology of big data analytics is divided into 5 key steps as follows: 1) Stakeholder mobilization and roundtables, 2) Gap analysis, 3) Establishment of a RD4D portal system, 4) Generating analytics/insights and dissemination, and 5) Operationalization, monitoring, evaluation and feedback.

(1) Stakeholder mobilization and roundtables: Multiple meat rabbit producers' cooperatives and other principal actors (academia, NGOs, GOs, consumer groups, etc.) in the meat rabbit value chain (MRVC) will be the primary stakeholders. The mobilization of stakeholders will involve the *principle of prior informed consent*, which implies full briefing about the objectives and goals of the RD4D, which embodies a new culture of data and value creation in the MRVC. In addition, core principles of rabbit project development, including feasibility, design, implementation, monitoring and evaluation (Lukefahr, 2010) will be applied. Further, consensus will be reached on the overall *modus operandi*, including mode and processes of data capture, data confidentiality and possibly, data anonymization, access and use of data analytics and insights, including value creation and utilization. Fair and equitable share of the benefits which arise from the utilization of the data analytics and intelligence will be assured following the philosophy of the Nagoya Protocols (CBD, 2011).

(2) Gap analysis entails a detailed study of the *status quo* to document current practices with respect to data culture and utilization in value creation. In particular, critical constraints, obstacles and barriers to success will be identified with solutions preferred. Gap analysis will be facilitated by stakeholders.

(3) Establishment of the RD4D portal system following the prototypes of DAGRIS (<http://www.dagris.info/about>) and Livestock Data for Decisions (LD4D, <https://ld4d.org/>). The portal will archive the following core datasets: a) data on input supply systems and networks for rabbit production (feeds and forages, healthcare, housing, suitable genetics/breeding stocks, etc.) across enterprises, locations, seasons and years, b) key performance indicators for rabbit productivity traits and indices (fertility, reproductive, pre- and post-weaning and cumulative litter performance, doe longevity, etc), c) data on meat rabbit products and value additions, d) production environment descriptors, e) marketing, socio-economics and gender roles; (f) data on local meat rabbit value chain actors and activities, and (g) metadata on all the categories above.

(4) Generating periodic analytics and dissemination to stakeholders in the MRVC: Analytics are the outputs of the RD4D server. These analytics essentially focus on trends and insights that will drive MRVC enterprises for viability and sustainability. Analytics will be tailored towards the specific needs

of each segment or actors and players in the MRVC. Similarly, dissemination will be tailored to the interests and needs of stakeholders and actors in each segment of the MRVC.

(5) Implementation, monitoring, evaluation and feedback: The details of the mode of implementation of the RD4D, as presented above, will be driven by key stakeholders and actors in the MRVC. A process of monitoring, evaluation and feedback (Lukefahr, 2010) will be applied.

RESULTS AND DISCUSSION

Table 1 presents a description of data categories and variables for documentation and analytics under the RD4D architecture. Categories of data identified were as described under Section 3 (Establishment of the RD4D portal system) above. Specific variables captured under each of these categories are indicated. Aggregation of data and metadata on all aspects of meat rabbit production and value chains would provide multiple advantages, including analytics, insights and intelligence on factors influencing all aspects of the meat rabbit value chain. This could facilitate policy interventions to boost enterprise and income from the meat rabbit value chain.

Table 1: Description of data sources for documentation in the RD4D architecture

| Category | Variables |
|--|--|
| 1. Input supply systems | Rabbit nutrition (Concentrate, forages, other); Genetics (Commercial breeds, heterogeneous stocks, local stocks); Healthcare (Vetcare, alternative, data on outbreak of diseases including VHD); Housing (Conventional, alternative, renewable) |
| 2. Key performance indicators | Adaptive and fitness-related traits, disease resistance; Fertility and reproductive traits; Survival rates (pre- and post-weaning); Growth (pre- and post-weaning, ADG); Finishing (final weight, dressing percentage, etc.); Other (e.g. doe longevity); Annual doe productivity indices (kindlings/doe/year, weaners/doe/year) |
| 3. Products, processing and value addition | Meat rabbit products; Value added rabbit products (local spices and menus), Product development |
| 4. Rabbit value chain | Chain actors, roles, functions, chain empowerment, volume and worth of transactions), total valuation |
| 5. Production environment descriptor (FAO, 2012) | Natural environment (daily minimum, mean and maximum temperature, relative humidity and precipitation); Management environment (rabbit production systems, colony sizes and dynamics, socio-economics, niche markets) |
| 6. Metadata (Guenther and Radebaugh, 2004) | Data about all the data above; Include structural, descriptive and reference metadata |

A generalized architecture for the implementation of the proposed RD4D portal is presented in Figure 1. The RD4D architecture consists of data repositories for the afore-mentioned datasets, which feed into the RD4D Warehouse server, with capabilities to integrate, manage and generate analytics and intelligence for specific segments of the MRVC. The RD4D Warehouse Server serves several purposes, including: (a) the aggregation and integration of all the data repositories, (b) data queries and management, and (c) generation of data analytics and intelligence, which constitute the basis for decision support systems for actors and stakeholders in the meat rabbit value chain. It is noted that the RD4D architecture is inspired by several platforms including: (a) *Livestock Data for Decisions* (LD4D, <https://ld4d.org/>), (b) *Domestic Animal Genetic Resources Information System* (DAGRIS, <http://www.dagris.info/about>), and (c) the “Integrated, Multi-purpose Animal Recording Systems” (FAO, 2016). All these platforms share a common philosophy – the use of a data culture for value creation. In particular, the LD4D is a Community of Practice that aims to drive informed livestock decision-making through improved data and analyses.

In this emerging era of big data analytics, global and local rabbit enterprises and value chains must leverage on the high potential opportunities provided by data through artificial intelligence and Internet of Things. The overarching goal is to maximise all accruable benefits from this era of data innovation for sustainable and viable meat rabbit enterprises. Some of these benefits include the following: (a) platforms for data-driven operations and decision support systems for all operations of the meat rabbit value chain; (b) enhanced efficiency of all operations in the meat rabbit value chain; (c) facilitate the design and implementation of intervention programmes that rely on evidence-based decision support tools and systems; (d) facilitate policy formulation and strategic plan of action for meat rabbit enterprises for wealth creation; (e) a framework for the dissemination of rabbit *data analytics* for sustainable meat rabbit enterprises; (f) a new data culture for meat rabbit enterprises, covering all aspects of production and marketing across multiple scales and production systems, among other benefits.

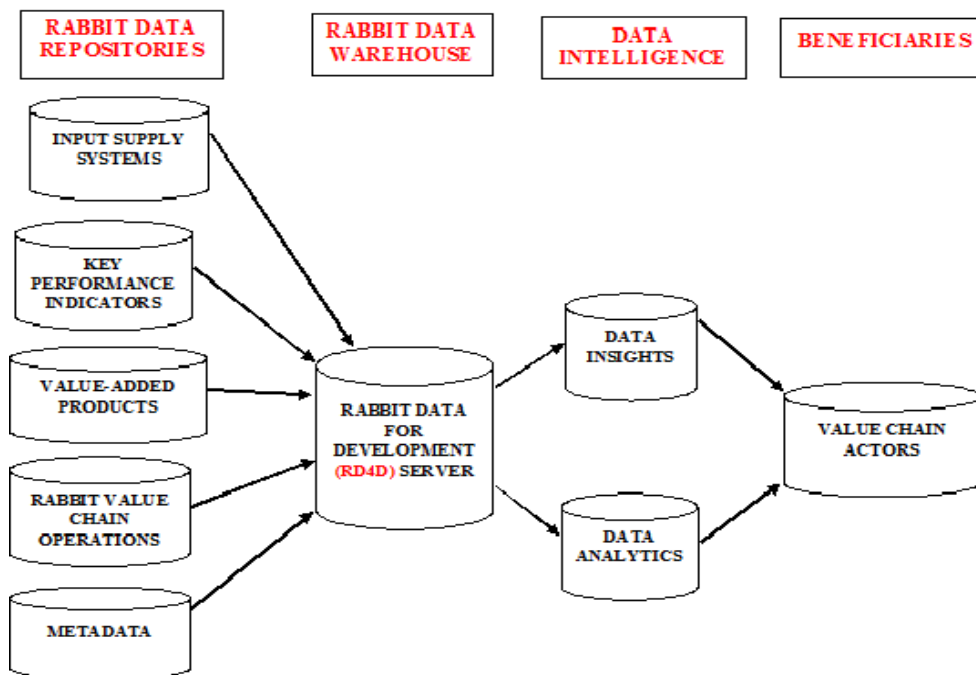


Figure 1. Rabbit data for development (RD4D) architecture

CONCLUSIONS

This paper proposed and described a full architecture for rabbit data for development (RD4D) using big data analytic tools. A key rationale is the creation of an information system to facilitate the compilation, organization and dissemination of data analytics, insights and intelligence, on all aspects of meat rabbit production and value chains, as a key strategy for value creation and poverty reduction.

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RABBIT DATA FOR DEVELOPMENT (RD4D): CONCEPT, PROCESSES, OUTCOMES

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INTRODUCTION

- Globally, there is a major upsurge in the application of “Big Data Analytics” in businesses and value creation in agriculture (Deloitte, 2018)
- The scope of big data applications in smart farming goes beyond primary production, as it influences the entire value chain (Wolfert *et al.*,2017)
- It becomes imperative that big data analytics and tools be deployed as part of a strategic intervention to promote rabbit enterprise and value chain development

INTRODUCTION

- With the proliferation of small- and medium-scale commercial meat rabbit holdings globally (FAOSTAT 2018), there is the possibility of accumulating mega datasets from these holdings.

INTRODUCTION

- Categories of core datasets that can be harnessed from these enterprises include:
 - (a) data on input supply systems for rabbit enterprises (feeds and forage supply, healthcare, housing, breeding stocks, etc.),
 - (b) data on key performance indicators on rabbit productivity,
 - (c) data on meat rabbit products and value additions,
 - (d) production environment descriptors (Scherf and Tixier-Boichard, 2009),
 - (e) data on marketing, socio-economics, and gender roles (e.g. cost-benefit analysis for smallholder meat rabbit operations by Lukefahr and Cheeke, 1990a);
 - (f) data on rabbit value chain actors and activities (Mutsami, 2019), and (f) metadata on all the categories above.

INTRODUCTION

- Some constraints and gaps
 - No mechanism(s) for harnessing mega data assets for value creation and rabbit enterprise development
 - Absence of a proper framework for data capture and management

INTRODUCTION

- Therefore, some key research questions would include the following:
 - (a) How can data assets promote the viability of small- and medium-scale meat rabbit enterprises?
 - (b) How can data intelligence be harnessed for sustainable meat rabbit enterprise development?
 - (c) What are the critical data requirements for meat rabbit value chains?
 - (d) Who are the critical stakeholders and how can they be mobilized and organized to harness data intelligence for enterprise development? and
 - (e) What are the expected benefits and risks under a new data paradigm and culture?

INTRODUCTION

- Main objective:
- to explore a strategy for the creation of an information system to facilitate the compilation, organization and dissemination of data analytics and insights, on all aspects of the meat rabbit value chains for wealth creation

MATERIALS AND METHODS

- Entire methodological framework is divided into 5 key steps:
 - Stakeholder mobilization and roundtables
 - Gap analysis
 - Establishment of a RD4D portal system
 - Generating analytics/insights and dissemination
 - Operationalization, monitoring, evaluation and feedback

Stakeholder mobilization and roundtables

- Primary stakeholders: Multiple meat rabbit producers' cooperatives and principal actors (academia, NGOs, GOs, consumer groups, etc.) in the meat rabbit value chain (MRVC)
- *Principle of Prior Informed Consent, or full briefing of the objectives and goals of the RD4D, which embodies a new culture of data and value creation in the MRVC.*
- Core principles of rabbit project development, including feasibility, design, implementation, monitoring and evaluation (Lukefahr, 2010) will be adapted and applied.

Stakeholder mobilization and roundtables

- Further, consensus will be reached on the overall *modus operandi*, including
 - Mode and processes of data capture,
 - Data confidentiality and possibly, data anonymization,
 - Access and use of data analytics and insights, including as well overall value creation and utilization
- Fair and equitable share of the benefits which arise from the utilization of the data analytics and intelligence will be assured following the philosophy of the Nagoya Protocols (CBD, 2011).

Gap analysis

- Gap analysis including *status quo* report to document current practices with respect to data culture and utilization in value creation
- Critical constraints, obstacles, risks and barriers to success will be identified with solutions preferred
- Gap analysis will be facilitated by stakeholders

Establishment of the RD4D portal system

- The RD4D portal system will be established following the prototypes of DAGRIS (<http://www.dagris.info/about>) and Livestock Data for Decisions (LD4D, <https://ld4d.org/>).
- The portal will archive the following core datasets:
- (a) data on input supply systems and networks for rabbit production (including feeds and forages, healthcare, housing, suitable genetics/breeding stock, etc.) across enterprises, locations, seasons and years,
- (b) key performance indicators for rabbit productivity traits and indices, including fertility, reproductive, pre- and post-weaning and cumulative litter performance and doe longevity,

Establishment of the RD4D portal system

- (c) data on meat rabbit products and value additions, including the use of local spices and menus, (d) production environment descriptors including temperature-humidity indices, among others,
- (e) marketing, socio-economics and gender roles;
- (f) miscellaneous data on local meat rabbit value chain actors and activities, and
- (g) metadata on all the categories above.

Periodic analytics and dissemination to stakeholders in the MRVC

- Analytics essentially focus on trends and insights that will drive MRVC enterprises for viability and sustainability.
- Analytics will be tailored towards the specific needs of each segment or actors and players in the MRVC.
- Similarly, dissemination will be tailored to the interests and needs of stakeholders and actors in each segment of the MRVC

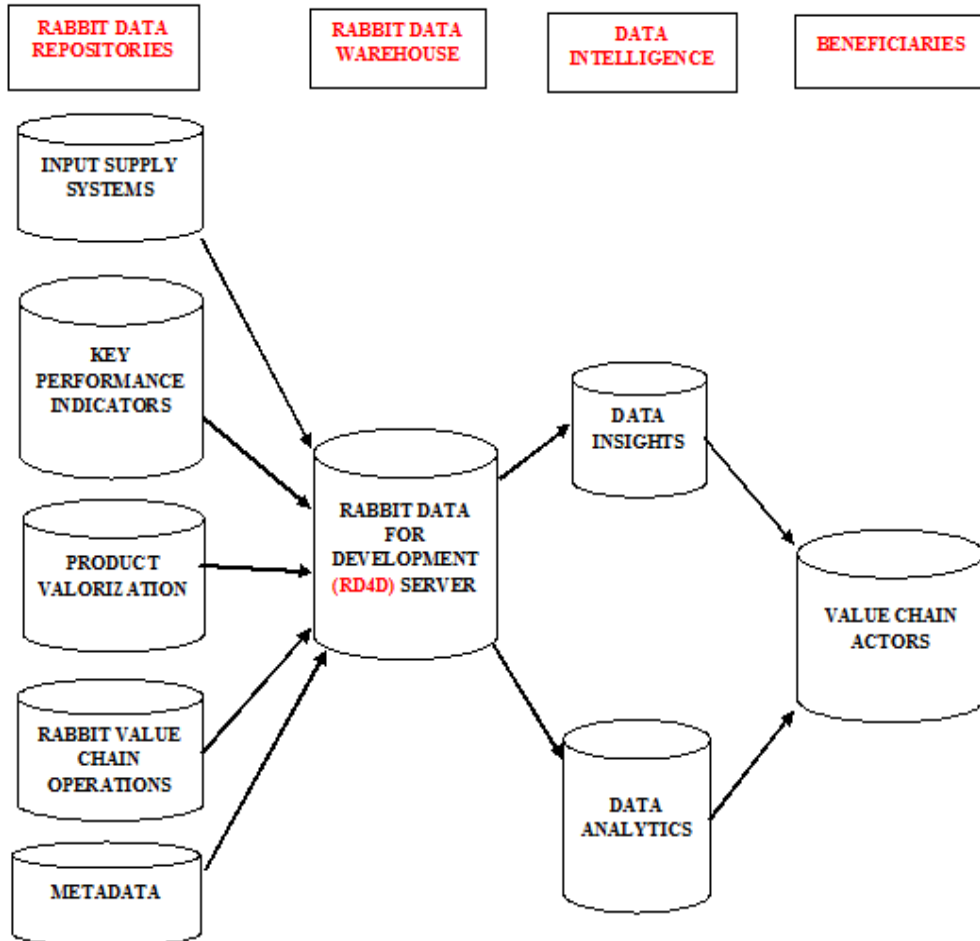
Implementation, monitoring, evaluation and feedback

- The details of the mode of implementation of the RD4D, as presented above, will be driven by key stakeholders and actors in the MRVC. A process of monitoring, evaluation and feedback (Lukefahr, 2010) will be applied.

Table 1: Description of data sources for documentation in the RD4D architecture

| Category | Variables |
|---|--|
| Input supply systems | <ul style="list-style-type: none"> a. Nutrition (Concentrate, forages, other) b. Genetics (Commercial breeds, heterogeneous stocks, local stocks) c. Healthcare (Veterinary healthcare, alternative, outbreak of diseases including VHD) d. Housing (Conventional, alternative, renewable) |
| Key performance indicators | <ul style="list-style-type: none"> a. Adaptive and fitness-related traits, disease resistance b. Fertility and reproductive traits c. Survival rates (pre- and post-weaning) d. Growth (pre- and post-weaning, ADG) e. Finishing (final weight, dressing percentage, etc.) f. Other (e.g. doe longevity) g. Annual doe productivity indices (kindlings/doe/year, weaners/doe) |
| Products, processing and value addition | <ul style="list-style-type: none"> a. Meat rabbit products b. Value added rabbit products (local spices and menus) c. Product development |
| Rabbit value chain | Chain actors, roles, functions, chain empowerment, volume and worth of transactions), total valuation |
| Production environment descriptor (FAO, 2012) | <ul style="list-style-type: none"> a. Natural environment (daily minimum, mean and maximum temperature, relative humidity and precipitation) b. Management environment (rabbit production systems, colony sizes and dynamics, socio-economics, niche markets) |
| Metadata (Guenther and Radebaugh, 2004) | <ul style="list-style-type: none"> a. Data about all the data above b. Include structural, descriptive and reference metadata³ |

Figure 1. Rabbit data for development (RD4D) architecture



DISCUSSION

- RD4D Warehouse Server serves several purposes,
 - (a) the aggregation and integration of all the data repositories, (b) data queries and management, and
 - (c) generation of data analytics and intelligence, which constitute the basis for decision support systems for actors and stakeholders in the meat rabbit value chain.
- RD4D architecture is inspired by several platforms
 - (a) *Livestock Data for Decisions* (LD4D, <https://ld4d.org/>),
 - (b) *Domestic Animal Genetic Resources Information System* (DAGRIS, <http://www.dagris.info/about>), and
 - (c) the “Integrated, Multi-purpose Animal Recording Systems” (FAO, 2016)

DISCUSSION

- In this emerging era of big data analytics, global and local rabbit enterprises and value chains must leverage on the high potential opportunities provided by data assets
- Overarching goal is to leverage on data innovation for sustainable and viable meat rabbit enterprise development

DISCUSSION

- Some **benefits** of RD4D:
 - (a) A platform for data-driven operations and decision support systems for all operations of the meat rabbit value chain;
 - (b) enhanced efficiency of all operations in the meat rabbit value chain;
 - (c) facilitate the design and implementation of intervention programmes that rely on evidence-based decision support tools and systems;
 - (d) facilitate policy formulation and strategic plan of action for meat rabbit enterprises for wealth creation;
 - (e) a framework for the dissemination of rabbit *data analytics* for sustainable meat rabbit enterprises;
 - (f) a new data culture for meat rabbit enterprises, covering all aspects of production and marketing across multiple scales and production systems, among other benefits.

CONCLUSION

- This paper proposed and described a full architecture for rabbit data for development (RD4D) using big data analytic tools
- A key rationale is the creation of an information system to facilitate the compilation, organization and dissemination of data analytics, insights and intelligence, on all aspects of meat rabbit production and value chains, as a key strategy for value creation

ACKNOWLEDGEMENTS

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