PROMOTING RABBIT HEALTH AND WELFARE BY COLLECTION AND ESTABLISHMENT OF RELIABLE HEALTH AND PERFORMANCE DATA IN THE TWO MAJOR SWISS MEAT RABBIT INTEGRATIONS

Schwarz J.[1]*, Schädler J.[2], Albini S.[2], Peter-Egli J.[3], Schüpbach G.[4], Wiederkehr D.[1]

[1]School of Agricultural, Forest and Food Sciences, Bern University of Applied Sciences, Laenggasse 85, 3052 Zollikofen, Switzerland
[2]National Reference Centre for Poultry and Rabbit Diseases (NRGK), Institute for Food Safety and Hygiene, Vetsuisse Faculty, University of Zurich, Winterthurerstr. 270, 8057 Zurich, Switzerland
[3]Swiss association of Swine Medicine (SVSM), Rebacker 15, 3671 Herbligen, Switzerland
[4]Department of Clinical Research and Veterinary Public Health, Vetsuisse Faculty, University of Bern, Schwarzenburgstr. 161, 3097 Liebefeld, Switzerland
*Corresponding author: julia.schwarz@bfh.ch

ABSTRACT

The legislation about rabbit housing conditions in Switzerland differs from that in other countries. Housing on wire mesh floor is prohibited and group housing in fattening units is mandatory. Despite these high-level housing conditions regarding animal welfare, animal losses remain a significant problem, exact numbers are lacking. The main aim of this ongoing study is to improve rabbit health by the collection of health and performance data. The collaboration with the two major meat rabbit production groups (Kani-Swiss GmbH, Integration Kyburz), which cover about 90% of the commercial production in Switzerland, enables the analysis of 52 farms and their performance data. On a primary investigation visit, the varying structures of the farms as well as their husbandry, hygiene and health management systems were recorded. Simultaneously, a prospective data collection done by the farmers is ongoing. For one year, data on every fattening group and litter is recorded with special interest in animal losses and medication, notably antimicrobials. Additional investigation visits during a period with an increased mortality rate allow the performance of necropsies and laboratory tests as well as the detection of changes in management to identify the triggering factors. General risk factors are identified by comparing farms with low and high mortality rates. As a result, specific prevention and intervention strategies are determined. Partial results of this ongoing study are yet available: during the first three months the mortality rate in fattening rabbits ranged from 3.7% to 41.6% with an average of 19.0%. The mortality in sucklings was 15.7% on average and varied from 4.3% to 34.1%. Besides coccidiostats, 17 of the 52 farms apply no additional medication, unlike 15 farms where antimicrobials are used on a regular basis for every fattening group.

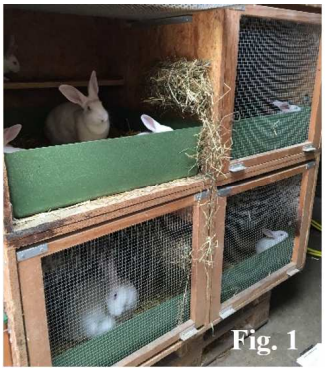
Key words: evaluation swiss meat rabbit production, mortality rates, usage of antimicrobials, risk factors, preventions strategies

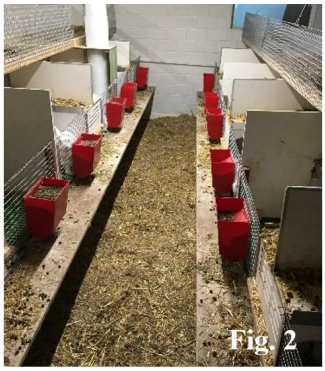
INTRODUCTION

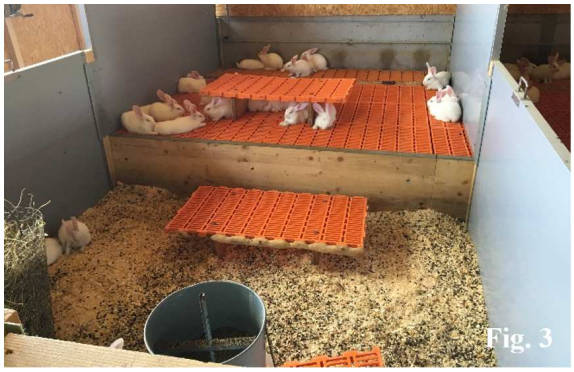
According to the Swiss animal welfare legislation, suckling and weanling rabbits of up to eight weeks must be kept in group housing systems (TschV Art. 64/65). Additionally, the housing on wire mesh floor is prohibited. The standards of husbandry systems of the two major meat-rabbit production groups (Integration Kyburz and Kani-Swiss GmbH) are above the minimal requirements of the Swiss animal welfare legislation (DZV Art. 74; BTS Guideline; IP Suisse Guideline). The two integrations provide more space for the animals, ground covering litter for fattening as well as breeding rabbits and group housing for fattening rabbits (Kyburz and Kani-Swiss) and breeding does (only Kani-Swiss) (Figures 1-3). These “animal-friendly” housing systems allow the rabbits to perform species-specific

behavior. Despite these high-level housing conditions regarding animal welfare, animal losses remain a significant problem. Group housing of rabbits on litter is challenging concerning hygiene management and comprises a higher risk for transmission of infectious diseases. Infectious agents such as coccidia, *Escherichia coli* and *Pasteurella multocida* are commonly found in rabbit farms but vary in their impact on animal health. For instance, coccidia can always be found in rabbit farms and pose problems mostly in weanlings but also in older animals (Hoop *et al.* 1993).
To date, precise data on health and performance and the related antimicrobial use in rabbit production systems in Switzerland is lacking to a great extent. In 2001, suckling mortality in Swiss rabbit production units was determined on eight rabbit breeding farms. The mortality rates on the individual farms showed a wide variation, ranging from 0% to 17.0 % during the investigation period (Leone-Singer and Hoop, 2003). This implies a high potential for improvements on some farms. To find adequate measures or prevention strategies for the most common diseases, it is necessary to first acquire more reliable and detailed information on the housing systems and production data of the farms. Secondly, analyzing disease outbreaks and the conditions in which they appear more closely will help to deduce possible preventive measures to maintain a high level of animal health.

The objectives of this study are to collect health and performance data and to identify risk factors for high mortality with the aim to improve rabbit health and welfare, and therefore to reduce animal losses and antimicrobial treatments.







Figures 1-3: Examples for different husbandry systems. Single housing for breeding rabbits (Fig. 1). Group housing for breeding rabbits (Fig. 2). Group housing for fattening rabbits (Fig. 3).

MATERIALS AND METHODS

Animals and experimental design

The study population are 52 farms differing in production system and size. The participating farms consist of 8 breeding farms, 13 fattening farms and 31 combined breeding and fattening farms. The smallest meat rabbit producer houses 6 breeding does and 120 fattening rabbits whereas the largest is comprised of 560 breeding and 10’000 fattening rabbits. In total 4’440 breeding does and 49’160 fattening rabbits are evaluated.

For one year every new litter and fattening group was documented by the farmers using a standardized production data sheet with special interest in animal losses and medication. Simultaneously, primary investigation visits by a veterinarian took place to record the varying farm structures including their husbandry, hygiene and health management systems. Additionally, fecal samples were collected on 50 farms and tested for *Salmonella* spp.. During periods with “increased mortality” second investigation visits by the same veterinarian take place allowing the detection of changes in management as well as the performance of further diagnostics such as necropsies and laboratory tests to identify the triggering factors. A cut-off for “increased mortality” was calculated using the data of the first three months and retrospective data of the last three years if available.

Laboratory testing

Per farm, a fecal pool-sample of 25 g was cultured according to the ISO method (Anonymous, 2017). Briefly, samples were incubated in "Buffered Peptone Water (ISO)" (Oxoid/Thermo Fisher Scientific,) for 24 h at 37 °C, subcultivated onto modified semi-solid Rappaport Vassiliadis medium (Merck) and incubated at 41.5 °C for 18 h. Suspicious swarming halos were subcultivated onto xylose lysine deoxycholate agar and Brilliance™ Salmonella agar (Oxoid/Thermo Fisher Scientific). Salmonella serotyping was carried out by the Swiss reference laboratory (ZOBA, Vetsuisse Faculty, University of Bern).

A thorough necropsy was performed in perished rabbits. Jejunum, ileum and caecum were cultured anaerobically on Columbia agar with 7% sheep blood and aerobically on bromthymolblue-lactose agar (Oxoid/Thermo Fisher Scientific). Both agars were incubated for 24 h at 37 °C. Altered tissues were cultivated aerobically on the same agars as described above. Bacterial identification was done with the Biotyper MALDI-TOF-MS system (Bruker Daltonics/Software: Compass flexControl Version 3.4; MBT Compass 4.1.80).

Parasitological examination of the intestine and gall bladder was done by microscopic examination of a smear of the contents, using a semiquantitative scheme.

Statistical Analysis

As this is an ongoing study only partial and basic descriptive statistics have been applied. Mean mortality rates have been calculated using data of the first three months and retrospective data of the last three years if available. It is planned to identify general risk factors identified by comparing farms with low and high mortality rates. As a result, specific prevention and intervention strategies are determined.

RESULTS AND DISCUSSION

Mortality rates

The mortality rates calculated with prospective data collected over a period of three months and retrospective data are showing a wide variation between farms. As expected, the differences among individual fattening groups are even greater (Table 1). Based on that the main causes of increased mortality and the differences between farms will be identified.

Table 1: Mortality rates in sucklings and fattening rabbits

	Age	Mortality rates %				
		Average of all farms	Min. average on farm level	Max. average on farm level	Min. single group	Max. single group
Sucklings	birth – weaning (approx. 0-30d)	15.7	4.3	34.1	0.0*[1]	100*[1]
Fattening rabbits	weaning – slaughter (approx. 30d-85d)	19.0	3.7	41.6	0.0*[2]	77.8*[2]

Mortality rates calculated with data of the first three months and retrospective data of the last three years if available.
*[1] single litter *[2] single group of fattening rabbits weaned simultaneously and fattened on the same farm

Laboratory testing and necropsies

Of the 50 farms tested for *Salmonella* spp. 47 were negative and 3 farms were positive for *Salmonella* Typhimurium. The 3 positive farms are linked by animal trade. Therefore, it can be assumed that *Salmonella* spp. is most likely only a local problem in the Swiss meat rabbit production.

So far, necropsies and laboratory testing were performed on 28 deceased rabbits of 10 farms with increased mortality. Consistent with the results of Hoop R. *et al.* 1993 intestinal coccidiosis and dysentery (*Escherichia coli, Clostridium perfringens*), were also the most frequent findings (Table 2).

Table 2: Number of examined organ samples positive for coccidia (*Eimeria* spp.) and pathogenic bacteria of 28 rabbits (n.a. = not applicable)

Examination/Pathogen	Jejunum	Ileum	Caecum	Liver / *Gallbladder	Lung	Bulla tympanica
Parasitology (semiquantitative)						
Eimeria spp.	14	16	16	3*	n.a.	n.a.
Bacteriology						
Escherichia coli	18	20	19	3	7	0
Clostridium perfringens	14	16	16	0	n.a.	n.a.
Pasteurella multocida	0	0	0	3	7	2

Antimicrobial use

Besides coccidiostats, 17 of the 52 farms apply no additional medication, unlike 15 farms where antimicrobials are used on a regular basis for every fattening group. The remaining 20 farms apply antimicrobial treatment if needed. Remarkably, farms using no antimicrobials at all, keep their breeding rabbits in single housing units and all fattening rabbits are born in single housing units. Contrary, farms where rabbits are regularly treated the fattening rabbits are mostly (86.7%) born in breeding units with group housing. Whether the housing system or other factors are responsible for this correlation must be clarified.

CONCLUSIONS

The wide variation of mortality rates found on different farms implies a high potential for improvement on several farms. Whereas *Salmonella* spp. are not one of the main causes for high mortality rates, group housing circumstances seem to be a main risk factor, which is additionally associated with a high antimicrobial use.

Despite that in its basic guidelines the Swiss animal welfare legislation is already very strict concerning size of pens, stocking density, authorized pen material and feeding, this study has shown that many different forms of housing systems exist especially for fattening rabbits. Final goal of this ongoing study is to identify the key factors helping to improve rabbit health and therefore reducing animal losses. The overall findings may prove useful in the revision of the Swiss animal welfare legislation or in writing additional guidelines, which on the one hand leads to an improvement in animal welfare aspects and on the other hand could significantly increase the profit of the producers.

ACKNOWLEDGEMENTS

This study is supported by the Swiss Federal Food Safety and Veterinary Office, Swiss animal welfare, Coop, Migros, IP Suisse and the Association of Swiss Rabbit Producers.

REFERENCES

Anonymous 2017. ISO 6579-1:2017, Annex C (C3): Performance characteristics of MSRV agar for detection of Salmonella spp. in animal faeces and in environmental samples from the primary production stage. *https://www.iso.org/standard/56712.html*

BTS Guideline, Richtlinie Coop Schweizer BTS Kaninchen, *https://www.kontrolldienst-sts.ch/html/images/Dokumente/Tierhaltung/RL_BTSKaninchen_Coop_September2009.pdf, accessed 10.12.2019.*

DZV, Verordnung über die Direktzahlungen an die Landwirtschaft Art. 74, version 01.01.2019, *https://www.admin.ch/opc/de/classified-compilation/20130216/index.html, accessed 10.12.19*

Hoop R., Ehrsam H., Keller B. 1993. 10 years of rabbit autopsy--a review of frequent disease and mortality causes. *Schweiz Arch Tierheilkd. 135(6-7),212-6.*

IP Suisse Guideline, IP Suisse Richtlinien für Kaninchen, *https://www.ipsuisse.ch/richtlinien-kaninchen/, accessed 10.12.2019.*

Leone-Singer A., Hoop R. 2003. Suckling mortality in fattening rabbits in Switzerland. *Schweiz Arch Tierheilkd., 145(7), 329-335.*

TschV, Schweizer Tierschutzverordnung *Art. 64 and 65, version 27.11.2018, https://www.admin.ch/opc/de/classified-compilation/20080796/index.html, accessed 10.12.2019*