



VETBIONET

Veterinary Bio-contained facility Network for excellence in animal infectiology research and experimentation

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Organization of 1 Summer Course at INRAE Premises

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Summary

Background

The provision of professional training and the development of supportive reflective spaces has been an important part of the work of VetBioNet, in particular through the work of the WP4 ethics team. Training is deemed to be a very important element of the VetBioNet service provision, not only as it extends skill sharing and networking but also supports research excellence, the development of important research skills across the community and enables the delivery of the VetBioNet goals both within the funding period and beyond.

The effects of the COVID restrictions have limited the type of training provision that could be offered and the opportunities to bring people together in person have effectively been prevented since early 2020. So in order to deliver training and to ensure the training would be attractive to the wider community and relevant to the VetBioNet goals, the difficult decision was taken to focus on quality training that was provided by those who have experienced of delivering online professional training.

The organization of Summer School and the alternative events that VetBioNet envisioned were thwarted several times due to the COVID pandemic. As the "classic" Summer School format could not be organized due to the early waves of the pandemic, the revised goal was to replace the School with an ambitious event in January 2021 focused on 3R approaches and celebrating VetBioNet's activities. The aim was to present the VetBioNet work in this field by highlighting the major contributions of VetBioNet's partners in terms of new study models (results of JRAs), 3R-related protocols made available to the community on the website and the training and wider teachings activities. The event was also intended to have a focus on knowledge exchange for early career researchers. This event was planned to take the form of a "3R week", gathering 60 people in person and on site at INRAE, and articulated around a 2-day workshop in Tours on "alternative research models to animal experimentation". It was also intended for a wider audience in the form of an online workshop, followed by a 3-day course focused on the 3Rs issue at the INRAE Center in Nouzilly. A programme had been prepared for the in-person activities, and hotel reservations and the structures for the course has been planned, but the COVID sanitary measures related to a winter 2021 / 22 wave of COVID at the beginning of 2022 forced the leader organiser INRAE to cancel the face-to-face and on-site event for researchers not affiliated and working directly at INRAE. However, INRAE was keen to and able to maintain the training course / content of a summer school, which was then delivered in a virtual form. This was achieved thanks to the reactivity and the significant involvement of UNOTT and EAAP.

So given the needs of VetBioNet and the circumstances, the VetBioNet community, INRAE, EAAP and UNOTT have partnered with FRAME and the FELASA course to deliver the INRAE School as a FELASA accredited Training 'Spring' School.

The UK organisation, FRAME in partnership with universities, NGOs and projects delivers regular training schools in experimental design and statistics to increase awareness among scientists about the need to reduce animal numbers in experiments and to refine procedures. Participants gain a better understanding of how to properly design and effectively analyse their experimental programmes so that they can go on to produce higher quality science, which has made the most efficient use of a minimum number of animals.

The INRAE VetBioNet Spring School was the fourteenth FRAME Training School in Experimental Design that has been delivered and was delivered in partnership with the University of Nottingham (UNOTT) and VetBioNet and held online. This Training School was held 'at' the INRAE Research Institute, France as this institute is a member of the EU infrastructure network, VetBioNet, and several researchers joined the previous two Training Schools. The VetBioNet participants' positive experience of these Training Schools resulted in the approach to University of Nottingham as a VetBioNet partner Dr Hudson-Shore to host the School at INRAE in January 2022. Due to the continued uncertainty and restrictions relating to the Covid-19 pandemic the decision was made to focus on delivering the training online rather than in-person.

Objectives

The key 3Rs objectives of the Training School are:

- to provide researchers with an understanding of basic design concepts that they do not seem to be gaining from other sources,
- to give researchers the ability to use more efficient designs for their experiments, and
- to stimulate engagement with the Three Rs and useful discussion between animal users in different sectors, such as industry and academia, on both refinement and reduction.

Rationale

Russell and Burch (1959)¹ identified that reduction in laboratory animal use can most effectively be achieved by rigorous experimental design and appropriate statistical analysis of any results. This Training School is an ideal opportunity to facilitate dialogue and enhance the application of experimental design and statistical analysis to animal experimentation. The Training School therefore focused on improving: a) animal

¹ Russell, W.M.S. & Burch, R.L. (1959). *The Principles of Humane Experimental Technique*, 238pp. London, UK: Methuen and Co.

welfare; b) the amount of information from a given number of animals involved and c) the quality of biomedical research and testing.

Teams involved

Dr Michelle Hudson-Shore and Prof. Kate Millar, UNOTT, UK.

Dr Maria-Isabel Thoulouze and Dr Sascha Trapp, INRAE, France.

Federico Liguori, EAAP, Italy.

Non-VetBioNet partners:

Amy Beale, FRAME, Nottingham, UK

<https://frametsjan2022.eventbrite.co.uk>

**Report Prepared by Dr Michelle Hudson-Shore and Prof. Kate Millar. UNOTT, UK
22 September 2022**

Organization of 1 Summer Course at INRAE Premises



1.1 Background and Description

The provision of professional training and the development of supportive reflective spaces has been an important part of the work of VetBioNet, in particular through the work of the WP4 ethics team. Training is deemed to be a very important element of the VetBioNet service provision, not only as it extends skill sharing and networking but also supports research excellence, the development of important research skills across the community and enables the delivery of the VetBioNet goals both within the funding period and beyond.

The effects of the COVID restrictions have limited the type of training provision that could be offered and the opportunities to bring people together in person have effectively been prevented since early 2020. So in order to deliver training and to ensure the training would be attractive to the wider community and relevant to the VetBioNet goals, the difficult decision was taken to focus on quality training that was provided by those who have experienced of delivering online professional training.

Organization of Summer School and the alternative events that VetBioNet envisioned were thwarted several times due to the COVID pandemic. As the "classic" Summer School format could not be organized due to the early waves of the pandemic, the revised goal was to replace the School with an ambitious event in January 2021 focused on 3R approaches and celebrating VetBioNet's activities. The aim was to present the VetBioNet work in this field by highlighting the major contributions of VetBioNet's partners in terms of new study models (results of JRAs), 3R-related protocols made available to the community on the website and the training and wider teachings activities. The event was also intended to have a focus on knowledge exchange for early career researchers. This event was planned to take the form of a "3R week", gathering 60 people in person and on site at INRAE, and articulated around a 2-day workshop in Tours on "alternative research models to animal experimentation". It was also intended for a wider audience in the form of an online workshop, followed by a 3-day course focused on the 3Rs issue at the INRAE Center in Nouzilly. A programme had been prepared for the in person activities, and hotel reservations and the structures for the course has been planned, but the COVID sanitary measures related to a winter 2021 / 22 wave of COVID at the beginning of 2022 forced the leader organiser INRAE to cancel the face-to-face and on-site event for researchers not affiliated and working directly at INRAE. However, INRAE was keen to and able to maintain the training course / content of a summer school, which was then delivered in a virtual form. This was achieved thanks to the reactivity and the significant involvement of UNOTT and EAAP.

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The Training School is aimed at those who are at postgraduate level or above. This course attracted participants from the UK, France, India, Italy, Spain, The Netherlands, Norway, Cyprus and Canada (see annex 1 for the full list of registered participants). The capacity of the event was reduced from the usual 50 to 30 to facilitate better interaction in the online platform.

The programme (see section 1.2) was taught by seven expert tutors:

- Dr Derek Fry
- Prof. Kate Millar
- Dr Michelle Hudson-Shore [Tutor and Training School Coordinator]
- Prof. Richard Preziosi
- Dr David Lovell
- Dr Martin Sullivan
- Prof. Adrian Smith [Guest Speaker]

The format included lectures, group discussions, and individual exercises. The programme (see section 1.2) was structured to lead the participants from simple experimental design and statistical ideas, through more complex methods and analysis to effective presentation of findings. Participants were also able to discuss their own research problems/experiences with the Training School tutors during the breaks and 'Ask the Expert' session. This interactive approach strengthens and supplements the information given in the more traditional lectures. The School traditionally fosters networking and dissemination of information between participants and to encourage this in a virtual environment, an online social space was provided (SpatialChat - <https://spatial.chat>). This was available for participants to access during lunchtimes and the scheduled social events. Uptake for this provision was relatively low but when participants used the tool, they found it very useful and enjoyed the experience.

1.2 Programme

The programme, made available to the participants prior the starting of the course, was as follows:

	Training School Programme, January 2022
	Online

Session	Time GMT	Session Title and Content	Lead Tutor	Supporting Tutor
Tuesday 25 January (pm)		Basic Principles		
	12.30-13.00	Welcome (Log in from 12.15, session starts at 12.30)	MHS	KM
1	13.00-13.45	Introduction to course: The Three Rs, legal and ethical aspects of Experimental Design.	MHS	KM
2	13.45-14.35	Quiz 1	DF	KM
	14.35-15.00	BREAK		
3	15.00-15.50	Principles of experimental design: types of experiment (pilot, exploratory, confirmatory), objectives, controls, experimental units, replication, randomization, blinding.	DF	RP
4	15.50-16.40	Common failings: unclear objectives, bias, lack of power, failure to randomize/blind, pseudoreplication. Costs of poor design.	RP	KM/DF
	16.40-16.55	Summary and information for Wednesday	MHS	KM
Wednesday 26 January		Basic Principles (Continued)		
	8.40-8.50	Welcome (Log in from 8.30, session starts at 8.40)	MHS	KM
5	8.50-9.50	Group Exercise 1: Controls, experimental units.	DF	KM/RP
6	9.50-10.40	Basic statistical inference: Null and alternative hypotheses, SD vs. SE, outliers, type I (false negative) & type II (false positive) errors, variables affecting significance, summary statistics.	DL	MS

	10.40-11.00	BREAK		
7	11.00-11.50	Sources of variability: in animal studies and how they may be controlled. Need for better design.	DF	DL
8	11.50-12.40	Importance of controlling variability: simulating experiments and the importance of controlling variability. Randomisation, sampling, Type 1 and Type 2 errors.	DL	DF
	12.40-13.40	LUNCH		
		Experimental Designs and Statistical Analysis		
9	13.40-14.30	The analysis of variance: post-hoc tests, assumptions, data transformations.	MS	DL
	14.30-14.50	BREAK		
10	14.50-15.40	Group Exercise 2: Finding basic faults.	DF	RP/KM
	15.40-15.55	Summary and Information for Thursday	KM	MHS
	16.00-17.00	VIRTUAL SOCIAL EVENT: Speed Networking		
Thursday 27 January		Experimental Designs and Statistical Analysis (Continued)		
	8.45-9.00	Welcome (Log in from 8.30, session starts at 8.45)	KM	MHS
11	9.00-9.50	Different Designs: completely randomised, randomised block and latin square designs. Power calculations, resource equation.	RP	DF
	9.50-10.10	BREAK		
12	10.10-11.00	Non-continuous data: qualitative data: contingency tables, non-parametric tests.	RP	DL
13	11.00-11.50	Factorial designs	MS	RP/DL
	11.50-12.50	LUNCH		
14	12.50-13.50	Group Exercise 3: Choosing the right design & over-night exercise.	DF	DL/RP

15	13.50-14.40	Experiments to test relationship: correlation, regression.	MS	DF/RP
	14.40-15.00	BREAK		
16	15.00-15.50	Tools and software: Power analysis, EDA and the pros and cons of software.	DL	RP/MS
	15.50-16.05	Summary and Information for Friday	MHS	KM
	16.10-17.10	VIRTUAL SOCIAL EVENT: It's All About You Quiz		
Friday 28 January		Applied Experimental Design and Important Design Messages		
	8.45-9.00	Welcome (Log in from 8.30, session starts at 8.45)	KM	MHS
17	9.00-9.40	Discussion of overnight exercise. Presentation and planning: presenting results and planning an experimental programme.	DF	KM/MHS
18	9.40-10.30	Quiz 2 and discussion.	DF	KM/MHS
	10.30-10.50	BREAK		
19	10.50-11.30	Ethics by design: Writing an experimental protocol, ethical review & 3Rs Including a presentation on the PREPARE Guidelines	KM AS	MHS
20	11.30-12.15	Searching and resources: searching for information on Rs and 3Rs resources	MHS	KM
21	12.15-12.30	Answers to Quiz 2 & take-home messages.	DF	KM
	12.30-13.30	LUNCH		
22	13.30-14.20	Ask the experts: opportunity for participants to discuss any unresolved design problems with the tutors	DF/DL/MS/RP/NC	KM or MHS
23	14.30-15.30	FELASA Examination	DF/KM	MHS

Tutors: Dr Michelle Hudson-Shore [MHS], Dr Derek Fry [DF], Dr David Lovell [DL], Prof. Kate Millar [KM], Prof. Richard Preziosi [RP], Dr Martin Sullivan [MS], Prof. Adrian Smith [AS].

1.3 Outcomes

Key Outcome

The main outcome is an increased awareness and understanding among participants of the need to reduce animal numbers in experiments and to refine procedures undertaken on them. Therefore, it is intended that this will translate into a reduction in the number of laboratory animals used and the suffering they may encounter.

In addition, with a better understanding of how to properly design experimental programmes and effectively analyse results, participants will go on to produce higher quality science, which has made most efficient use of resultant improved data.

Participant Feedback

The Training School was very well received with participant's providing very positive feedback, which was in line with previous years in-person and online feedback. Daily feedback surveys were conducted as well as overall course feedback. Details for all of the feedback is collated in the Training School Feedback Summary Report, which is available on request. In summary, all of the participants who provided overall feedback said that they would recommend the course to colleagues, the majority said that the instructors provided helpful assistance and agreed that the course had exposed them to new knowledge and practices (see annex 2 for a full summary of responses). Many participants made additional comments, such as:

"Thank you very much for such wonderful organisation, a very professional and interactive course. Many thanks to all the tutors for their didactic presentations. The examples provided are really useful to understand better and see how to concretely use this knowledge for our experiments. Many many thanks."

"Every effort was made to make the course as interactive and inclusive as possible despite the online setting - well done and thank you. Tutors were very well versed in their covered topics which made their delivery much more engaging and useful - particularly when there was cross over in topics covered by individual tutors, the multiple viewpoints gave plenty of food for thought. Although topics covered in days 2/3 were difficult the group sessions were a huge help in solidifying the principles and applying them to scenarios."

"The course was well-designed and covered aspects that previous LAS courses I attended did not. Especially the emphasis on statistics was very useful. Some exercises regarding statistics might have been useful, but I do understand that these are often very time-consuming. Overall, the course was informative, all teachers were obviously very knowledgeable and extremely helpful. I would definitely recommend this course to anyone working with animals!"

Knowledge Acquisition

To gain insight into how successful training of this nature is the Training School tutors designed a set of questions, which were given to the participants at the start and end of the course. The answers to these questions were collated and analysed to determine the participants' existing knowledge on the subject and then to establish if and what they had learned as a consequence of the training. In line with previous events, there was an increase in understanding for all the areas tested (figure 1) and the participants overall scores also increased after the training (figure 2).

Figure 1: Comparison of the overall understanding by area of experimental design, before and after training by participants in the Online Training School January 2022.

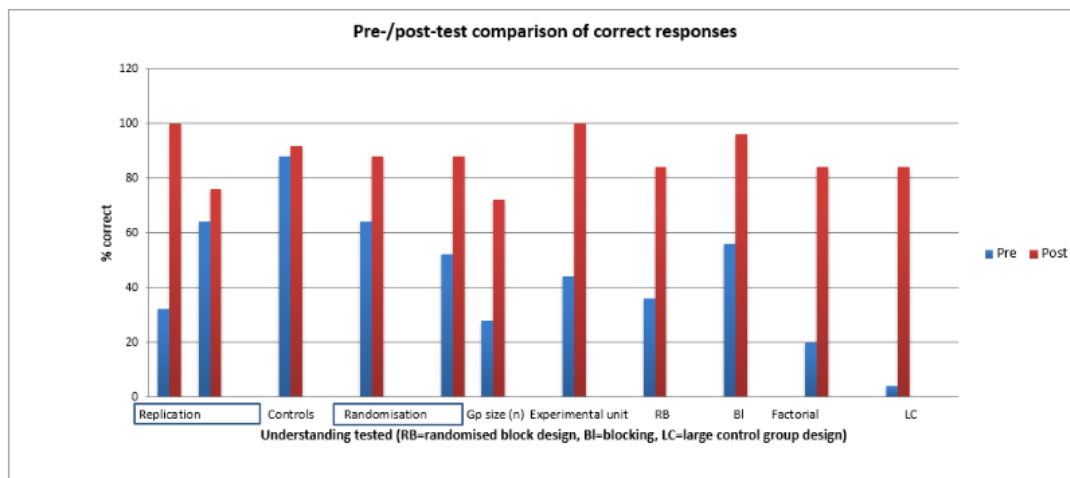
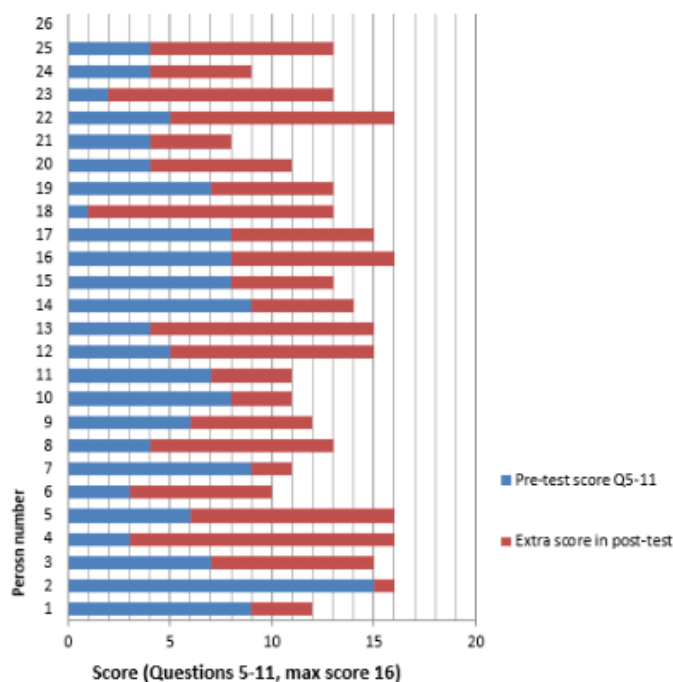


Figure 2: Comparison of participants' overall test scores before and after the Online Training School, January 2022 [2 participants did not take part in the quiz].



FELASA Accreditation

Since 2017, the Training School has been accredited by FELASA (Federation of European Laboratory Animal Science Associations). Therefore, it was possible to offer the participants the opportunity to take an examination to receive a FELASA certificate. Of the 27 participants that fully completed the course, 25 opted to take the examination. All but two participants passed. The participant's that failed the first time were given the opportunity to re-sit the exam, within one month of the course, and passed on that occasion.

Annex 1: Registered Participants' List

	Name*	Affiliation/ country	Attended
1	X.X.	University of Nottingham / UK	Yes
2	X.X.	Eurofins-Ingenasa / Spain	Yes
3	X.X.	Istituto Zooprofilattico Sperimentale delle Venezie / Italy	Yes
4	X.X.	INRAE / France	Yes
5	X.X.	INRAE / France	Yes
6	X.X.	APHA / UK	Yes
7	X.X.	Crick Institute / UK	Yes
8	X.X.	INRAE / France	Yes
9	X.X.	International Livestock Research Institute / kenya	Yes
10	X.X.	INIA / Spain	Yes
11	X.X.	Erasmus MC / NL	Partial
12	X.X.	INRAE / France	Yes
13	X.X.	University of Chester /UK	No
14	X.X.	INRAE / France	Yes
15	X.X.	INRAE / France	Yes
16	X.X.	INSERM U1259 / France	Yes
17	X.X.	INSERM U1259 / France	Yes
18	X.X.	University of Aberdeen / UK	Yes
19	X.X.	University of Nottingham / UK	Yes
20	X.X.	INRAE / France	Yes
21	X.X.	INRAE / France	Yes
22	X.X.	Western University / Canada	Yes
23	X.X.	INRAE / France	Yes
24	X.X.	Toulouse Vet School / France	Yes
25	X.X.	Vet Ex Machina Ltd./ Cyprus	No
26	X.X.	University of Sheffield / UK	Yes
27	X.X.	INRAE / France	Yes
28	X.X.	INRAE / France	Yes
29	X.X.	University of Bergen/ Norway	Yes
30	X.X.	INIA / Spain	Yes

*Names have been anonymized.

Annex 2: Overall Feedback from Participant's

Training School Feedback Summary, Online January 2022		
Question	Response	Number of Responses
The Design of the Course		
The objectives of the course were clear to you	Agree Neutral Disagree	17 1 0
The course contents met with your expectation	Agree Neutral Disagree	15 3 0
The lecture sequence was well planned	Agree Neutral Disagree	17 1 0
The course exposed you to new knowledge and practices	Agree Neutral Disagree	17 1 0
You would recommend this course to your colleagues	Agree Neutral Disagree	18 0 0
The contents were illustrated with adequate examples	Too low Enough Too many	1 17 0
The academic level of the course was appropriate	Too low Correct Too high	1 15 2
The Delivery of the Course		
The lectures were clear and easy to understand	Agree Neutral Disagree	14 4 0
The course material provided was adequate	Agree Neutral Disagree	17 1 0
The group sessions were clear and easy to understand	Agree Neutral Disagree	18 0 0
The instructors provided helpful assistance	Agree Neutral Disagree	18 0 0
Background Information		
Please rate your confidence in applying the 3Rs when planning your experiments BEFORE attending (1 = No confidence, 10 = Very confident)	1 2 3 4 5 6 7 8 9 10	2 0 3 1 3 3 3 2 0 1 [Average score = 5.3]
Please rate your confidence in applying the 3Rs when planning your experiments AFTER attending (1 = No confidence, 10 = Very confident)	1 2 3 4 5 6 7 8 9 10	0 0 0 0 1 1 1 8 6 1 [Average score = 8.1]
How did you hear about the School (choose all that apply)	Internal email Colleague FRAME Website Direct Email Social Media Flyer Other	3 8 2 1 1 0 6 [5 VetBioNet; 1 Supervisor]

Responses: 18/27 (67%)

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