Horizon 2020 Programme

INFRAIA-02-2017
Integrating Activities for Starting Communities

SmartCow: an integrated infrastructure for increased research capability and innovation in the European cattle sector

SmartCow
an integrated infrastructure for increased research capability and innovation in the European cattle sector

Project ID: 730924

Deliverable number: D1.5

Deliverable title: Catalogue of equipment and techniques practiced throughout Europe and the protocols associated with each of the pieces of equipment and techniques

EC version : V1

Due date of milestone	**30/11/2018 (M10)**
Actual submission date	**21/12/2018 (M11)**

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement n°730924

DOCUMENT INFO

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2. Revision history

Version	Date	Modified by	Comments

3. Dissemination level

PU	Public	X
CO	Confidential , only for members of the consortium (including the Commission Services)	☐

SmartCow
an integrated infrastructure for increased research capability and innovation in the European cattle sector

EXECUTIVE SUMMARY

Background	Within Europe there are many research institutes which have common equipment and related techniques (e.g. automatic feeders to record intake, devices to measure CH4 emissions…). It would be beneficial if there was a database available which catalogued this information and was freely available for numerous reasons (e.g. if one institute had operational issues with a piece of equipment another institute which had the same piece of equipment could be contacted and the issue resolved). To ensure the feasibility of this approach research institutes within the SmartCow consortium will initially be contacted and information collected. Once the data collection process is streamlined and dissemination methods agreed and created (D1.2) other EU research institutes and eventually research institutes outside of the EU can also be included. Collection of this data will provide an insight into the strengths and weaknesses of each piece of equipment/technique which will be invaluable for young researchers and those wishing to incorporate such techniques into experimental protocols.
Objectives	The objective of task 1.3 was to catalogue available equipment and related techniques which are in use across the consortium
Methods	A contact person from each research institute within the consortium was identified at the kick off meeting and their email address obtained. An exhaustive list of the equipment associated with different measurement techniques was developed and an excel spread sheet created to collect the data. Before sending to all project partners the file was sent to a smaller group of people involved in the project to review and identify any areas which were missing or where more information was required. Once this sub-committee was satisfied with database, it was sent to the people within the consortium whose email addresses were collected at the kick off meeting.

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	Once all information was returned it was collated into one document, validated and sent to partners working on Tasks 1.1 and 3.1 to allow them to further their respective work packages.
Results & implications	All partners within the consortium agreement filled out the database and returned it. As a result SmartCow now has a comprehensive catalogue of all the available equipment and related techniques within each of the consortium research institute. This information can now be developed into an interactive map (D1.2) which will be available for everyone with access to the SmartCow website to view. The information was also sent to those involved in WP 3.1 and will help attain their deliverable (D3.3) of producing a book of experimental methods in Ruminant Physiology which will be available to the public. Into the future the database created can also be sent to research institutes outside of the SmartCow consortium to garner further information regarding available equipment and related techniques within their research institutes.

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1 Background

Within Europe there are many research institutes which have common equipment and related techniques (e.g. automatic feeders to record intake, devices to measure CH4 emissions…). It would be beneficial if there was a database available which catalogued this information and was freely available for numerous reasons (e.g. if one institute had operational issues with a piece of equipment another institute which had the same piece of equipment could be contacted and the issue resolved).

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Collection of this data will provide an insight into the strengths and weaknesses of each piece of equipment/technique which will be invaluable for young researchers and those wishing to incorporate such techniques into experimental protocols.

2 Objective

The objective of task 1.3 was to catalogue available equipment and related techniques which are in use across the consortium.

3 Methodology

To enable accurate and time efficient collection of the required data a contact person from each research institute within the consortium was identified at the kick off meeting and their email address obtained. The database was designed and sent to each of these people with a deadline by which it had to be filled in and returned.

3.1 Database construction

An exhaustive list of the equipment associated with different measurement techniques was developed and an excel spread sheet created to collect the data. The different headings under which extensive information was required were as per deliverable 1.3.

Before sending to all project partners the file was sent to a smaller group of people involved in the project to review and identify any areas which were missing or where more information was required. Once this sub-committee were satisfied with database it was sent to the people within the consortium whose email address were collected at the kick off meeting.

Once all information was returned it was collated into one document, validated and sent to partners working on Tasks 1.1 and 3.1 to allow them to further their respective work packages.

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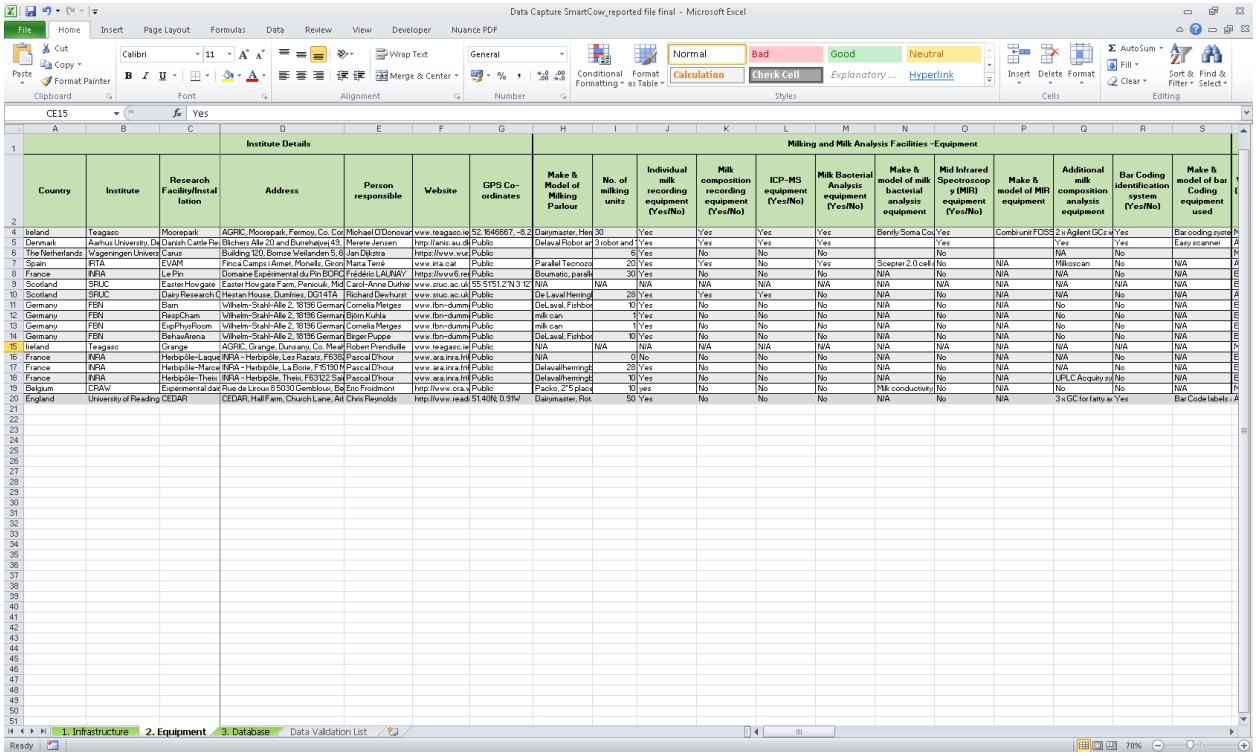
(Note: Rather than send three separate documents requiring information all the information required for Tasks 1.1, 1.2 and 1.3 was created on different excel sheets within the one excel file)

3.1.1 Overview of data collected

To give an overview of the content of the database, the following are screen shots of the data which has been collected and passed to the relevant people in Task 1.1 and Task 3.1 to allow them to progress their respective areas.



	Institute Details							Milking and Milk Analysis Facilities -Equipment												
	Country	Institute	Research Facility/Installation	Address	Person responsible	Website	GPS Co-ordinates	Make & Model of Milking Parlour	No. of milking units	Individual milk recording equipment (Yes/No)	Milk composition recording equipment (Yes/No)	ICP-MS equipment (Yes/No)	Milk Bacterial Analysis equipment (Yes/No)	Make & model of milk bacterial analysis equipment	Mid Infrared Spectroscopy (MIR) equipment (Yes/No)	Make & model of MIR equipment	Additional milk composition analysis equipment	Bar Coding identification system (Yes/No)	Make & model of bar Coding equipment used	
4	Ireland	Teagasc	Moorepark	AGRIC, Moorepark, Fermoy, Co. Cor	Michael O'Donovar	www.teagasc.ie	52.1646667, -8.2	Dairymaster, Her	30	Yes	Yes	Yes	Yes	Bently Soma Co	Yes	Combi unit FOSS	2 x Agilent GCs w	Yes	Bar coding syste	
5	Denmark	Aarhus University, De	Danish Cattle Re	Blichers Alle 20 and Burenhøvej 43,	Merete Jensen	http://anis.au.dk	Public	Delaval Robot ar	3 robot and	Yes	Yes	Yes	Yes		Yes		Yes	Yes	Easy scanner	
6	The Netherlands	Wageningen Univers	Carus	Building 120, Bornse Weilanden 5, 6	Jan Dijkstra	https://www.wur	Public		6	Yes	No	No	No		No		NA	No		
7	Spain	IRTA	EVAM	Finca Camps i Armet, Monells, Giron	Marta Terré	www.irta.cat	Public	Parallel Teonozo	20	Yes	Yes	No	Yes	Scepter 2.0 cell	No	N/A	Milkoscan	No	N/A	
8	France	INRA	Le Pin	Domaine Experimental du Pin BORC	Frédéric LAUNAY	https://www6.ret	Public	Boumatic, parall	30	Yes	No	No	No	N/A	No	N/A	N/A	No	N/A	
9	Scotland	SRUC	Easter Howgate	Easter Howgate Farm, Penicuik, Mid	Carol-Anne Duthie	www.sruc.ac.uk	55 51'51.2"N 3 12'	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10	Scotland	SRUC	Dairy Research C	Hestan House, Dumfries, DG14TA	Richard Dewhurst	www.sruc.ac.uk	Public	De Laval Herring	28	Yes	Yes	Yes	No	N/A	No	N/A	N/A	No	N/A	
11	Germany	FBN	Barn	Wilhelm-Stahl-Allee 2, 18196 German	Cornelia Metges	www.fbn-dumm	Public	DeLaval, Fishbor	10	Yes	No	No	No	N/A	No	N/A	No	No	N/A	
12	Germany	FBN	RespChem	Wilhelm-Stahl-Allee 2, 18196 German	Björn Kuhla	www.fbn-dumm	Public	milk can	1	Yes	No	No	No	N/A	No	N/A	No	No	N/A	
13	Germany	FBN	ExpPhysRoom	Wilhelm-Stahl-Allee 2, 18196 German	Cornelia Metges	www.fbn-dumm	Public	milk can	1	Yes	No	No	No	N/A	No	N/A	No	No	N/A	
14	Germany	FBN	BehawArena	Wilhelm-Stahl-Allee 2, 18196 German	Birger Puppe	www.fbn-dumm	Public	DeLaval, Fishbor	10	Yes	No	No	No	N/A	No	N/A	No	No	N/A	
15	Ireland	Teagasc	Grange	AGRIC, Grange, Dunsany, Co. Meat	Robert Prendiville	www.teagasc.ie	Public	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
16	France	INRA	Herbipôle-Laqué	INRA – Herbipôle, Les Racats, F636	Pascal D'hour	www.ara.inra.fr	Public	N/A	0	No	No	No	No	N/A	No	N/A	N/A	No	N/A	
17	France	INRA	Herbipôle-Marcel	INRA – Herbipôle, La Borie, F15190	Pascal D'hour	www.ara.inra.fr	Public	Delaval herring	28	Yes	No	No	No	N/A	No	N/A	N/A	No	N/A	
18	France	INRA	Herbipôle-Theix	INRA – Herbipôle, Theix, F63122 Sai	Pascal D'hour	www.ara.inra.fr	Public	Delaval herring	10	Yes	No	No	No	N/A	No	N/A	UPLC Acquity sy	No	N/A	
19	Belgium	CRAW	Experimental dair	Rue de Liroux 8 5030 Gembloux, Be	Eric Froidmont	http://www.cra.v	Public	Packo, 2*5 place	10	yes	No	No	No	Milk conductivity	No	N/A	No	No	N/A	
20	England	University of Reading	CEDAR	CEDAR, Hall Farm, Church Lane, Ait	Chris Reynolds	http://www.read	51.40N, 0.91W	Dairymaster, Rot	50	Yes	No	No	No	N/A	No	N/A	3 x GC for fatty a	Yes	Bar Code labels - A	

Figure 1. List of research institutes and their respective milking and milk analysis facilities and equipment

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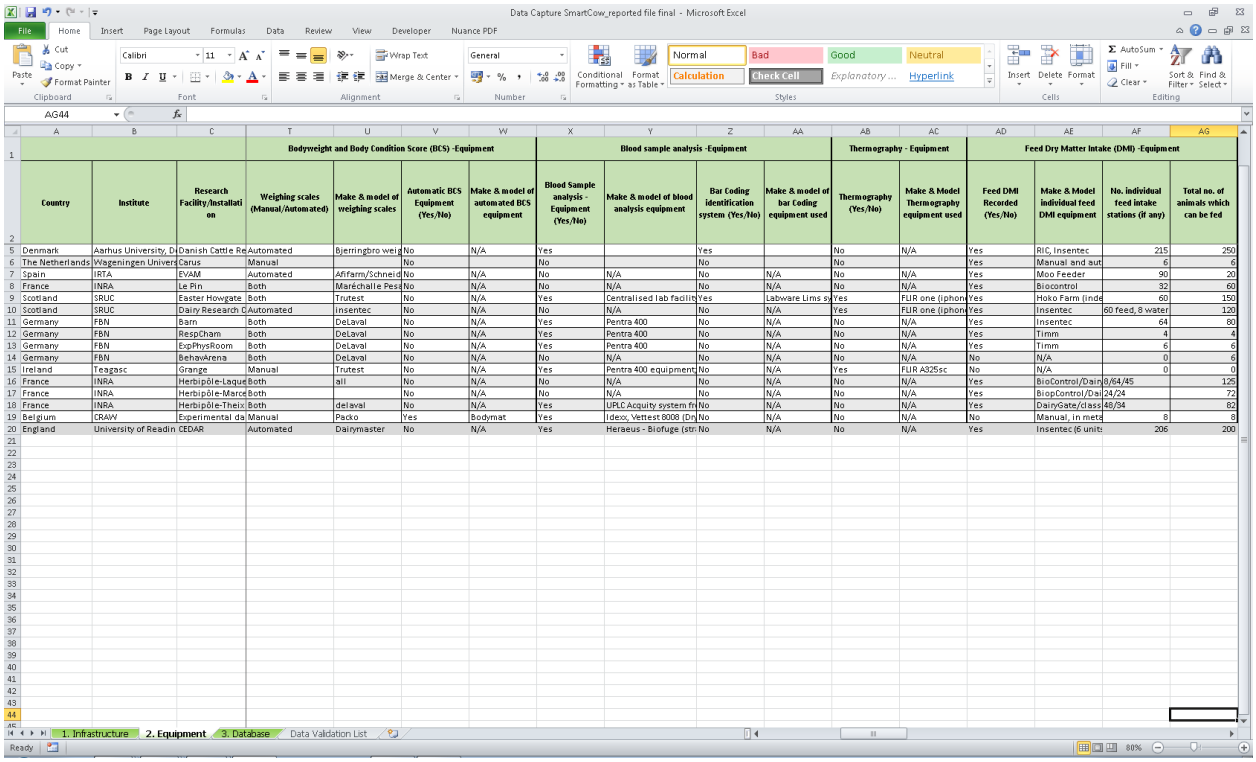
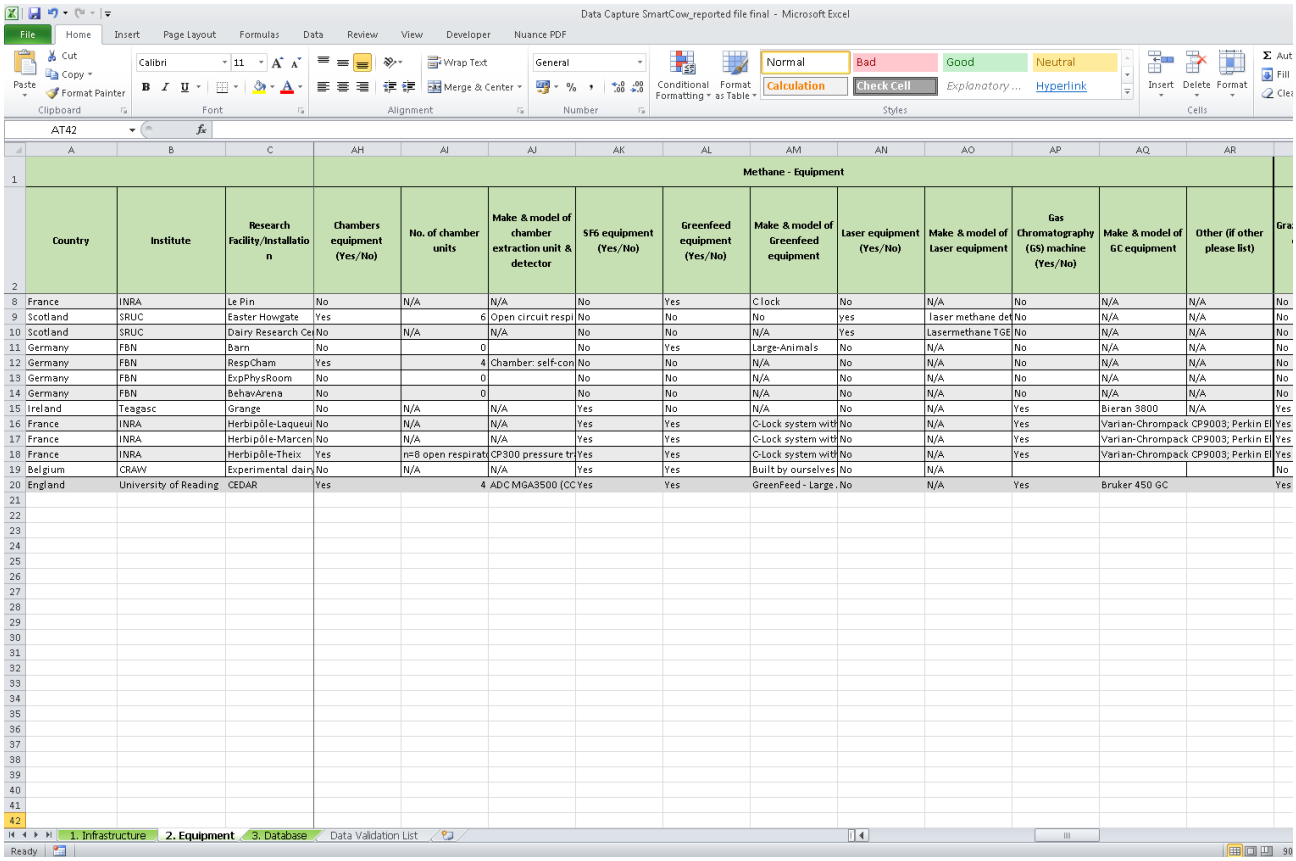


	Bodyweight and Body Condition Score (BCS) -Equipment							Blood sample analysis -Equipment				Thermography - Equipment		Feed Dry Matter Intake (DMI) -Equipment			
Country	Institute	Research Facility/Installation	Weighing scales (Manual/Automated)	Make & model of weighing scales	Automatic BCS Equipment (Yes/No)	Make & model of automated BCS equipment	Blood Sample analysis - Equipment (Yes/No)	Make & model of blood analysis equipment	Bar Coding identification system (Yes/No)	Make & model of bar Coding equipment used	Thermography (Yes/No)	Make & Model Thermography equipment used	Feed DMI Recorded (Yes/No)	Make & Model individual feed DMI equipment	No. individual feed intake stations (if any)	Total no. of animals which can be fed
Denmark	Aarhus University, D	Danish Cattle Re	Automated	Bjerringbro weig	No	N/A	Yes		Yes		No	N/A	Yes	RIC, Insentec	215	250
The Netherlands	Wageningen Univers	Carus	Manual		No		No		No		No		Yes	Manual and aut	6	6
Spain	IRTA	EVAM	Automated	Afifarm/Schneid	No	N/A	No	N/A	No	N/A	No	N/A	Yes	Moo Feeder	90	20
France	INRA	Le Pin	Both	Maréchalle Pes	No	N/A	No	N/A	No	N/A	No	N/A	Yes	Biocontrol	32	60
Scotland	SRUC	Easter Howgate	Both	Trutest	No	N/A	Yes	Centralised lab facilit	Yes	Labware Lims sy	Yes	FLIR one (iphon	Yes	Hoko Farm (inde	60	150
Scotland	SRUC	Dairy Research C	Automated	Insentec	No	N/A	No	N/A	No	N/A	Yes	FLIR one (iphon	Yes	Insentec	60 feed, 8 water	120
Germany	FBN	Barn	Both	DeLaval	No	N/A	Yes	Pentra 400	No	N/A	No	N/A	Yes	Insentec	64	80
Germany	FBN	RespCham	Both	DeLaval	No	N/A	Yes	Pentra 400	No	N/A	No	N/A	Yes	Timm	4	4
Germany	FBN	ExpPhysRoom	Both	DeLaval	No	N/A	Yes	Pentra 400	No	N/A	No	N/A	Yes	Timm	6	6
Germany	FBN	BehavArena	Both	DeLaval	No	N/A	No	N/A	No	N/A	No	N/A	No	N/A	0	6
Ireland	Teagasc	Grange	Manual	Trutest	No	N/A	Yes	Pentra 400 equipment	No	N/A	Yes	FLIR A325sc	No	N/A	0	0
France	INRA	Herbipôle-Laque	Both	all	No	N/A	No	N/A	No	N/A	No	N/A	Yes	BioControl/Dain	8/64/45	125
France	INRA	Herbipôle-Marce	Both		No	N/A	No	N/A	No	N/A	No	N/A	Yes	BiopControl/Dai	24/24	72
France	INRA	Herbipôle-Theix	Both	delaval	No	N/A	Yes	UPLC Acquity system fr	No	N/A	No	N/A	Yes	DairyGate/class	48/34	82
Belgium	CRAW	Experimental da	Manual	Packo	Yes	Bodymat	Yes	Idexx, Vettest 8008 (Dr	No	N/A	No	N/A	No	Manual, in meta	8	8
England	University of Readin	CEDAR	Automated	Dairymaster	No	N/A	Yes	Heraeus - Biofuge (str	No	N/A	No	N/A	Yes	Insentec (6 units	206	200

Figure 2. List of research institutes and their respective equipment associated with bodyweight and body condition score (BCS) , blood sample analysis, thermography and feed dry matter intake (DMI)



	Methane - Equipment													
Country	Institute	Research Facility/Installation	Chambers equipment (Yes/No)	No. of chamber units	Make & model of chamber extraction unit & detector	SF6 equipment (Yes/No)	Greenfeed equipment (Yes/No)	Make & model of Greenfeed equipment	Laser equipment (Yes/No)	Make & model of Laser equipment	Gas Chromatography (GS) machine (Yes/No)	Make & model of GC equipment	Other (if other please list)	Gra
France	INRA	Le Pin	No	N/A	N/A	No	Yes	C lock	No	N/A	No	N/A	N/A	No
Scotland	SRUC	Easter Howgate	Yes	6	Open circuit respi	No	No	No	yes	laser methane det	No	N/A	N/A	No
Scotland	SRUC	Dairy Research Ce	No	N/A	N/A	No	No	N/A	Yes	Lasermethane TGE	No	N/A	N/A	No
Germany	FBN	Barn	No	0		No	Yes	Large-Animals	No	N/A	No	N/A	N/A	No
Germany	FBN	RespCham	Yes	4	Chamber: self-con	No	No	N/A	No	N/A	No	N/A	N/A	No
Germany	FBN	ExpPhysRoom	No	0		No	No	N/A	No	N/A	No	N/A	N/A	No
Germany	FBN	BehavArena	No	0		No	No	N/A	No	N/A	No	N/A	N/A	No
Ireland	Teagasc	Grange	No	N/A	N/A	Yes	No	N/A	No	N/A	Yes	Bieran 3800	N/A	Yes
France	INRA	Herbipôle-Laqueu	No	N/A	N/A	Yes	Yes	C-Lock system with	No	N/A	Yes	Varian-Chrompack CP9003; Perkin El		Yes
France	INRA	Herbipôle-Marcen	No	N/A	N/A	Yes	Yes	C-Lock system with	No	N/A	Yes	Varian-Chrompack CP9003; Perkin El		Yes
France	INRA	Herbipôle-Theix	Yes	n=8 open respirat	CP300 pressure tr	Yes	Yes	C-Lock system with	No	N/A	Yes	Varian-Chrompack CP9003; Perkin El		Yes
Belgium	CRAW	Experimental dair	No	N/A	N/A	Yes	Yes	Built by ourselves	No	N/A				No
England	University of Reading	CEDAR	Yes	4	ADC MGA3500 (CC	Yes	Yes	GreenFeed - Large .	No	N/A	Yes	Bruker 450 GC		Yes

Figure 3. List of research institutes and their respective equipment associated with methane measurements

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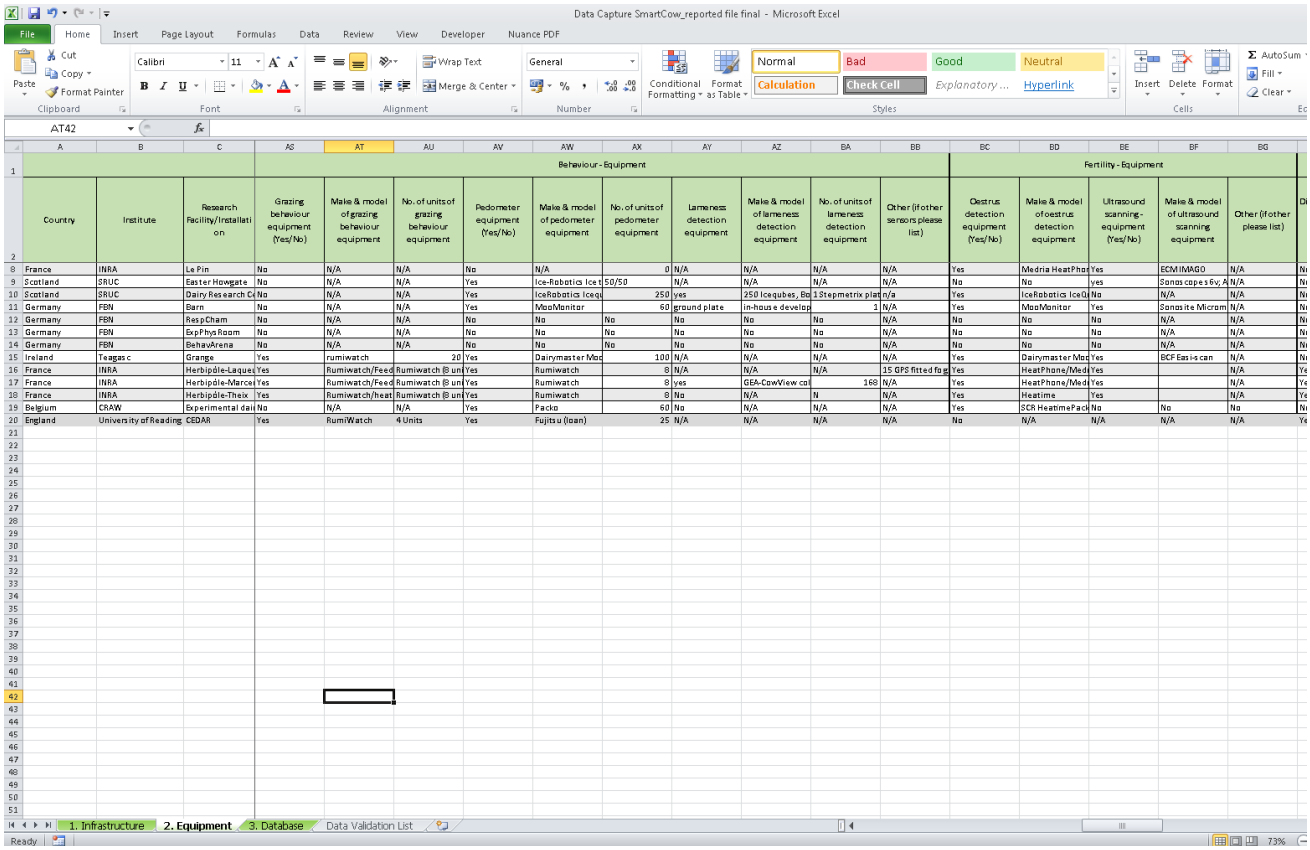
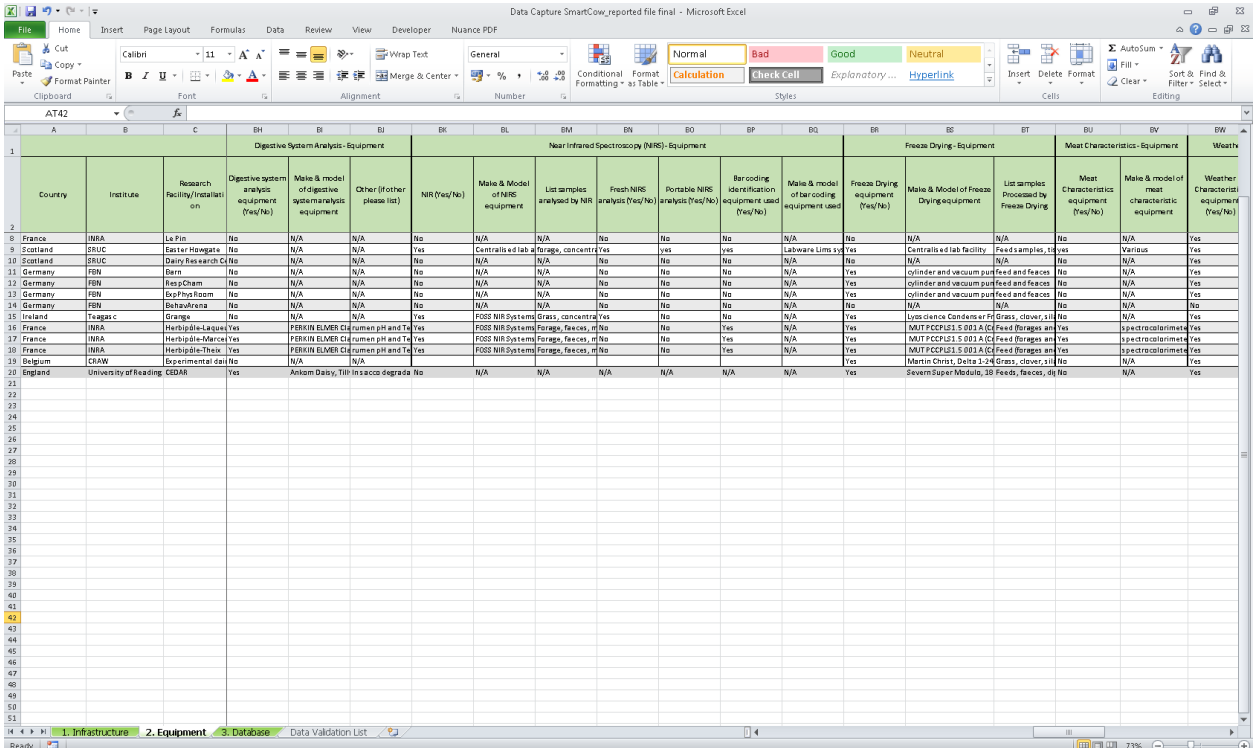


Country	Institute	Research Facility/Installation	Grazing behaviour equipment (Yes/No)	Make & model of grazing behaviour equipment	No. of units of grazing behaviour equipment	Pedometer equipment (Yes/No)	Make & model of pedometer equipment	No. of units of pedometer equipment	Lameness detection equipment	Make & model of lameness detection equipment	No. of units of lameness detection equipment	Other (if other sensors please list)	Oestrus detection equipment (Yes/No)	Make & model of oestrus detection equipment	Ultrasound scanning - equipment (Yes/No)	Make & model of ultrasound scanning equipment	Other (if other please list)
			Behaviour - Equipment										Fertility - Equipment				
France	INRA	Le Pin	No	N/A	N/A	No	N/A	0	N/A	N/A	N/A	N/A	Yes	Medria HeatPhor	Yes	ECM IMAGO	N/A
Scotland	SRUC	Easter Howgate	No	N/A	N/A	Yes	Ice-Robotics Ice t	50/50	N/A	N/A	N/A	N/A	No	No	yes	Sonos cope s6v; A	N/A
Scotland	SRUC	Dairy Research C	No	N/A	N/A	Yes	IceRobotics Iceqı	250	yes	250 Icecubes, Bo	1 Stepmetrix plan	n/a	Yes	IceRobotics IceQ	No	N/A	N/A
Germany	FBN	Barn	No	N/A	N/A	Yes	MooMonitor	60	ground plate	in-house develop	1	N/A	Yes	MooMonitor	Yes	Sonos ite Microm	N/A
Germany	FBN	RespCham	No	N/A	N/A	No	No	No	No	No	No	N/A	No	No	No	N/A	N/A
Germany	FBN	ExpPhysRoom	No	N/A	N/A	No	No	No	No	No	No	N/A	No	No	No	N/A	N/A
Germany	FBN	BehavArena	No	N/A	N/A	No	No	No	No	No	No	N/A	No	No	No	N/A	N/A
Ireland	Teagasc	Grange	Yes	rumiwatch	20	Yes	Dairymaster Mod	100	N/A	N/A	N/A	N/A	Yes	Dairymaster Mod	Yes	BCF Easi-s can	N/A
France	INRA	Herbipôle-Laque	Yes	Rumiwatch/Feed	Rumiwatch (8 uni	Yes	Rumiwatch	8	N/A	N/A	N/A	15 GPS fitted flag	Yes	HeatPhone/Medi	Yes		N/A
France	INRA	Herbipôle-Marce	Yes	Rumiwatch/Feed	Rumiwatch (8 uni	Yes	Rumiwatch	8	yes	GEA-CowView cal	168	N/A	Yes	HeatPhone/Medi	Yes		N/A
France	INRA	Herbipôle-Theix	Yes	Rumiwatch/heat	Rumiwatch (8 uni	Yes	Rumiwatch	8	No	N/A	N	N/A	Yes	Heatime	Yes		N/A
Belgium	CRAW	Experimental dai	No	N/A	N/A	Yes	Packo	60	No	N/A	N/A	N/A	Yes	SCR HeatimePack	No	No	N/A
England	University of Reading	CEDAR	Yes	RumiWatch	4 Units	Yes	Fujitsu (loan)	25	N/A	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A

Figure 4. List of research institutes and their respective equipment associated with animal behaviour and fertility measurements



Country	Institute	Research Facility/Installation	Digestive system analysis equipment (Yes/No)	Make & model of digestive system analysis equipment	Other (if other please list)	NIR (Yes/No)	Make & Model of NIRS equipment	List samples analysed by NIR	Fresh NIRS analysis (Yes/No)	Portable NIRS analysis (Yes/No)	Bar coding identification equipment used (Yes/No)	Make & model of bar coding equipment used	Freeze Drying equipment (Yes/No)	Make & Model of Freeze Drying equipment	List samples Processed by Freeze Drying	Meat Characteristics equipment (Yes/No)	Make & model of meat characteristic equipment	Weather Characteristi equipment (Yes/No)
			Digestive System Analysis - Equipment			Near Infrared Spectroscopy (NIRS) - Equipment							Freeze Drying - Equipment			Meat Characteristics - Equipment		Weath
France	INRA	Le Pin	No	N/A	N/A	No	N/A	N/A	No	No	No	N/A	No	N/A	N/A	No	N/A	Yes
Scotland	SRUC	Easter Howgate	No	N/A	N/A	Yes	Centralised lab a	forage, concentra	Yes	yes	yes	Labware Lims sy	Yes	Centralised lab facility	Feed samples, tis	yes	Various	Yes
Scotland	SRUC	Dairy Research C	No	N/A	N/A	No	N/A	N/A	No	No	No	N/A	No	N/A	N/A	No	N/A	Yes
Germany	FBN	Barn	No	N/A	N/A	No	N/A	N/A	No	No	No	N/A	Yes	cylinder and vacuum pun	feed and feaces	No	N/A	Yes
Germany	FBN	RespCham	No	N/A	N/A	No	N/A	N/A	No	No	No	N/A	Yes	cylinder and vacuum pun	feed and feaces	No	N/A	Yes
Germany	FBN	ExpPhysRoom	No	N/A	N/A	No	N/A	N/A	No	No	No	N/A	Yes	cylinder and vacuum pun	feed and feaces	No	N/A	Yes
Germany	FBN	BehavArena	No	N/A	N/A	No	N/A	N/A	No	No	No	N/A	No	N/A	N/A	No	N/A	No
Ireland	Teagasc	Grange	No	N/A	N/A	Yes	FOSS NIR Systems	Grass, concentra	Yes	No	No	N/A	Yes	Lyophilizer Condenser Fr	Grass, clover, sil	No	N/A	Yes
France	INRA	Herbipôle-Laque	Yes	PERKIN ELMER Cla	rumen pH and Te	Yes	FOSS NIR Systems	Forage, faeces, m	No	No	Yes	N/A	Yes	MUT PCCPLS 1.5 001 A (C	Feed (forages an	Yes	spectrocolorimete	Yes
France	INRA	Herbipôle-Marce	Yes	PERKIN ELMER Cla	rumen pH and Te	Yes	FOSS NIR Systems	Forage, faeces, m	No	No	Yes	N/A	Yes	MUT PCCPLS 1.5 001 A (C	Feed (forages an	Yes	spectrocolorimete	Yes
France	INRA	Herbipôle-Theix	Yes	PERKIN ELMER Cla	rumen pH and Te	Yes	FOSS NIR Systems	Forage, faeces, m	No	No	Yes	N/A	Yes	MUT PCCPLS 1.5 001 A (C	Feed (forages an	Yes	spectrocolorimete	Yes
Belgium	CRAW	Experimental dai	No	N/A	N/A								Yes	Martin Christ, Delta 1-24	Grass, clover, sil	No	N/A	Yes
England	University of Reading	CEDAR	Yes	Ankom Daisy, Till	In sacco degrada	No	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Severn Super Modulo, 18	Feeds, faeces, di	No	N/A	Yes

Figure 5. List of research institutes and their respective equipment associated with digestive system analysis, near infrared spectroscopy (NIRS), freeze drying and meat characteristics

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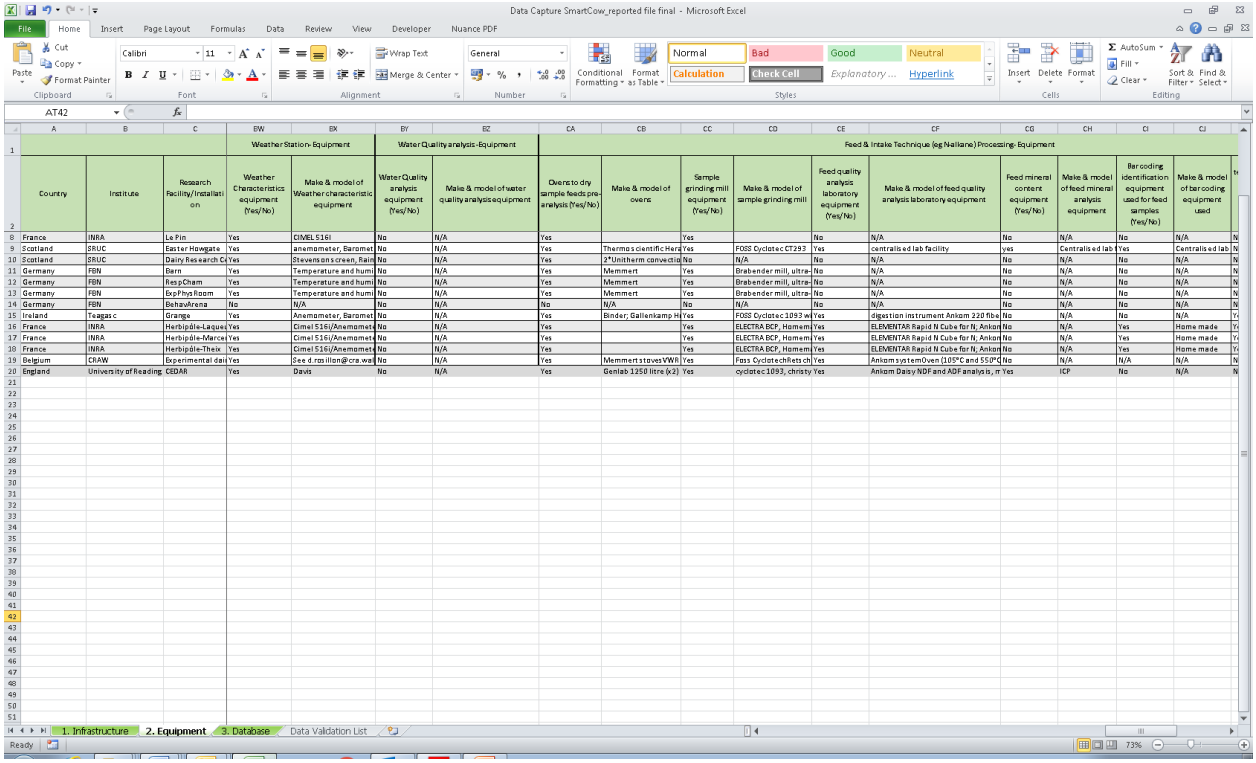
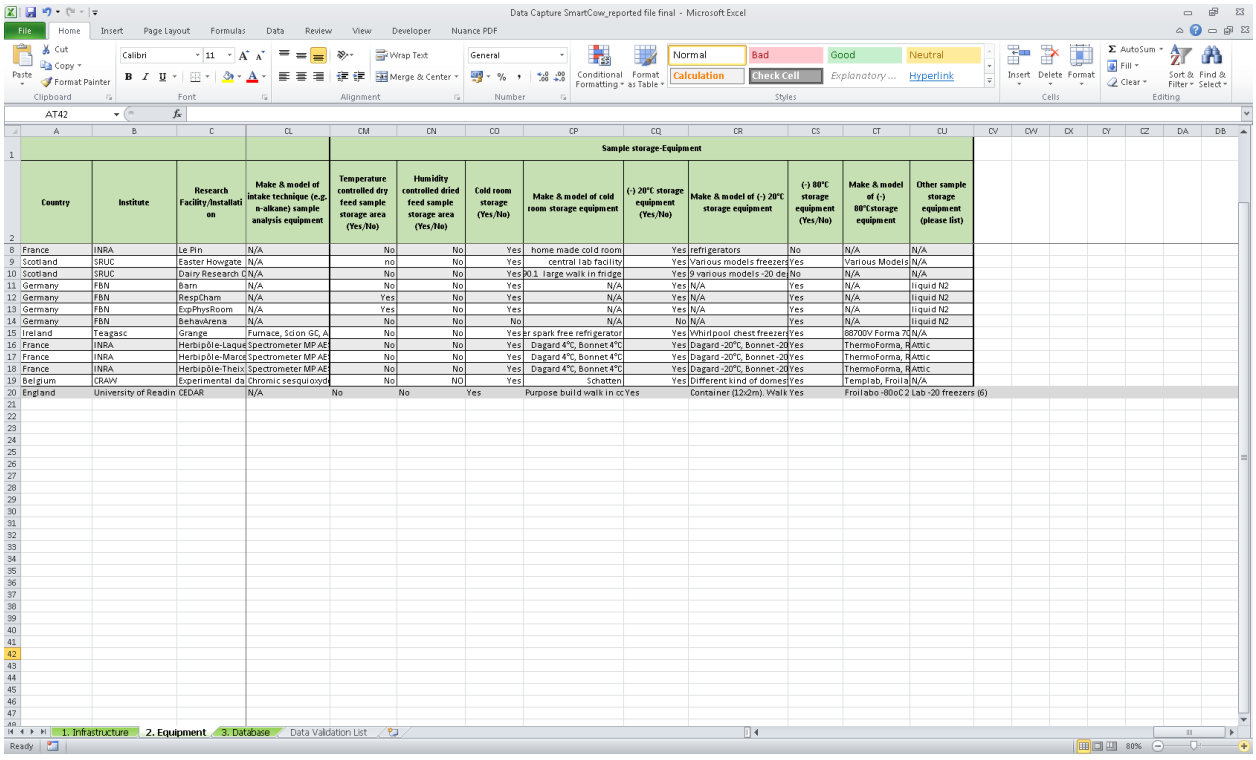


Country	Institute	Research Facility/Installation	Weather Characteristics equipment (Yes/No)	Make & model of Weather characteristic equipment	Water Quality analysis equipment (Yes/No)	Make & model of water quality analysis equipment	Oven to dry sample feeds pre-analysis (Yes/No)	Make & model of ovens	Sample grinding mill equipment (Yes/No)	Make & model of sample grinding mill	Feed quality analysis laboratory equipment (Yes/No)	Make & model of feed quality analysis laboratory equipment	Feed mineral content equipment (Yes/No)	Make & model of feed mineral analysis equipment	Bar coding identification equipment used for feed samples (Yes/No)	Make & model of bar coding equipment used
			Weather Station-Equipment		Water Quality analysis-Equipment		Feed & Intake Technique (eg Nalkane) Processing: Equipment									
France	INRA	Le Pin	Yes	CIMEL 516i	No	N/A	Yes		Yes		No	N/A	No	N/A	No	N/A
Scotland	SRUC	Easter Howgate	Yes	anemometer, Barometer	No	N/A	Yes	Thermoscientific Hera	Yes	FOSS Cyclotec CT293	Yes	centralised lab facility	yes	Centralised lab	Yes	Centralised lab
Scotland	SRUC	Dairy Research C	Yes	Stevensons creen, Rain	No	N/A	Yes	3*Unitherm convectio	No	N/A	No	N/A	No	N/A	No	N/A
Germany	FBN	Barn	Yes	Temperature and humi	No	N/A	Yes	Memmert	Yes	Brabender mill, ultra-	No	N/A	No	N/A	No	N/A
Germany	FBN	RespCham	Yes	Temperature and humi	No	N/A	Yes	Memmert	Yes	Brabender mill, ultra-	No	N/A	No	N/A	No	N/A
Germany	FBN	ExpPhysRoom	Yes	Temperature and humi	No	N/A	Yes	Memmert	Yes	Brabender mill, ultra-	No	N/A	No	N/A	No	N/A
Germany	FBN	BehavArena	No	N/A	No	N/A	No	N/A	No	N/A	No	N/A	No	N/A	No	N/A
Ireland	Teagasc	Grange	Yes	Anemometer, Baromet	No	N/A	Yes	Binder; Gallenkamp H	Yes	FOSS Cyclotec 1093 wi	Yes	digestion instrument Ankom 220 fibe	No	N/A	No	N/A
France	INRA	Herbipôle-Laque	Yes	Cimel 516i/Anemomet	No	N/A	Yes		Yes	ELECTRA BCP, Homemi	Yes	ELEMENTAR Rapid N Cube for N; Ankon	No	N/A	Yes	Home made
France	INRA	Herbipôle-Marce	Yes	Cimel 516i/Anemomet	No	N/A	Yes		Yes	ELECTRA BCP, Homemi	Yes	ELEMENTAR Rapid N Cube for N; Ankon	No	N/A	Yes	Home made
France	INRA	Herbipôle-Theix	Yes	Cimel 516i/Anemomet	No	N/A	Yes		Yes	ELECTRA BCP, Homemi	Yes	ELEMENTAR Rapid N Cube for N; Ankon	No	N/A	Yes	Home made
Belgium	CRAW	Experimental dai	Yes	See d.rollin@cra.wal	No	N/A	Yes	Memmert stoves VWh	Yes	Foss Cyclotec Retsch	Yes	Ankom system Oven (105°C and 550°C	No	N/A	N/A	N/A
England	University of Reading	CEDAR	Yes	Davis	No	N/A	Yes	Genlab 1250 litre (x2)	Yes	cyclotec 1093, christy	Yes	Ankom Daisy NDF and ADF analysis, m	Yes	ICP	No	N/A

Figure 6. List of research institutes and their respective equipment associated with weather stations, water quality, feed and intake techniques



Country	Institute	Research Facility/Installation	Make & model of intake technique (e.g. n-alkane) sample analysis equipment	Temperature controlled dry feed sample storage area (Yes/No)	Humidity controlled dried feed sample storage area (Yes/No)	Cold room storage (Yes/No)	Make & model of cold room storage equipment	(-) 20°C storage equipment (Yes/No)	Make & model of (-) 20°C storage equipment	(-) 80°C storage equipment (Yes/No)	Make & model of (-) 80°Cstorage equipment	Other sample storage equipment (please list)
				Sample storage-Equipment								
France	INRA	Le Pin	N/A	No	No	Yes	home made cold room	Yes	refrigerators	No	N/A	N/A
Scotland	SRUC	Easter Howgate	N/A	no	No	Yes	central lab facility	Yes	Various models freezers	Yes	Various Models	N/A
Scotland	SRUC	Dairy Research C	N/A	No	No	Yes	90.1 large walk in fridge	Yes	9 various models -20 de	No	N/A	N/A
Germany	FBN	Barn	N/A	No	No	Yes	N/A	Yes	N/A	Yes	N/A	liquid N2
Germany	FBN	RespCham	N/A	Yes	No	Yes	N/A	Yes	N/A	Yes	N/A	liquid N2
Germany	FBN	ExpPhysRoom	N/A	Yes	No	Yes	N/A	Yes	N/A	Yes	N/A	liquid N2
Germany	FBN	BehavArena	N/A	No	No	No	N/A	No	N/A	Yes	N/A	liquid N2
Ireland	Teagasc	Grange	Furnace, Scion GC, A	No	No	Yes	er spark free refrigerator	Yes	Whirlpool chest freezer	Yes	88700V Forma 70	N/A
France	INRA	Herbipôle-Laque	Spectrometer MP AES	No	No	Yes	Dagard 4°C, Bonnet 4°C	Yes	Dagard -20°C, Bonnet -20	Yes	ThermoForma, R	Attic
France	INRA	Herbipôle-Marce	Spectrometer MP AES	No	No	Yes	Dagard 4°C, Bonnet 4°C	Yes	Dagard -20°C, Bonnet -20	Yes	ThermoForma, R	Attic
France	INRA	Herbipôle-Theix	Spectrometer MP AES	No	No	Yes	Dagard 4°C, Bonnet 4°C	Yes	Dagard -20°C, Bonnet -20	Yes	ThermoForma, R	Attic
Belgium	CRAW	Experimental da	Chromic sesquioxyd	No	NO	Yes	Schatten	Yes	Different kind of domes	Yes	Templab, Froilab	N/A
England	University of Readin	CEDAR	N/A	No	No	Yes	Purpose build walk in cc	Yes	Container (12x2m). Walk	Yes	Froilabo -80oC 2 Lab -20 freezers (6)	

Figure 7. List of research institutes and their respective equipment associated with sample storage

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4 Results and Implications

All partners within the consortium agreement filled out the database and returned it. As a result SmartCow now has a comprehensive catalogue of all the available equipment and related techniques within each of the consortium research institutes.

This information can now be developed into an interactive map (D1.2) which will be available for everyone with access to the SmartCow website to view.

The information was also sent to those involved in WP 3.1 and will help attain their deliverable (D3.3) of producing a book of experimental methods in Ruminant Physiology which will be available to the public.

Into the future the database created can also be sent to research institutes outside of the SmartCow consortium to garner further information regarding available equipment and related techniques within their research institutes. This will allow a more exhaustive list of equipment and techniques to be established (milestones in year 2, 3 and 4 of the project). This will allow existing infrastructures to update their data in the database. Beyond the SmartCow project, the database can be reissued in future infrastructure projects.

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