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: D1.3

Deliverable title: Creation of an inventory of the animal databases and research methodologies used in SmartCow RIs

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

1. Author(s)

Organisation name lead contractor	Teagasc

Author	Organisation	e-mail
Emer Kennedy	Teagasc	Emer.kennedy@teagasc.ie
Michael O'Donovan	Teagasc	Michael.odonovan@teagasc.ie
Clare Guy	Teagasc	Clare.guy@teagasc.ie
Katie Sugrue	Teagasc	Katie.Sugrue@teagasc.ie

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)	☐

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

SmartCow

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

EXECUTIVE SUMMARY

Background	Individual research institutes collect data on variables recorded (e.g. diet, weight, milk production, etc.). However, to date there is no individual database cataloguing what variables are recorded and what animal databases exist. Therefore, it would be very beneficial if there was a centralised database available which catalogued this information. This information could then be made available to a wide range of research centres. Research institutes within the SmartCow consortium were initially contacted and information collected on variables recorded and animal databases available. Collection of this data provides an insight into variables recorded at each research institute and this provides a centralised database of animal inventories at each research institute. Once the data collection process is streamlined and dissemination methods agreed and created, other EU research institutes and eventually research institutes outside of the EU can also be included. This will be very beneficial to researchers involved in various research topics.
Objectives	This deliverable falls under task 1.2 of WP1. The objective of task 1.2 was to describe and map research animal databases and existing sample banks, and their accessibility across the participating organisations.
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 animal databases and research methodologies inventories associated with each research institute 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 these sub-committee were satisfied with database, it was sent to the people within the consortium whose email addresses were collected at the kick off meeting.

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

Results & implications	An inventory of the animal databases employed in SmartCow participating organisations was developed, including an account of variables recorded in each research institute. Into the future the database created can also be sent to research institutes outside of the SmartCow consortium to garner further information regarding animal databases and related methodologies within their research institute.

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

Table of contents

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

1 Background

Individual research institutes collect data on variables recorded (e.g. diet, weight, milk production, etc.). However, to date there is no individual database cataloguing what variables are recorded and what animal databases exist. Therefore, it would be very beneficial if there was a centralised database available which catalogued this information. This information could then be made available to a wide range of research centres.

Research institutes within the SmartCow consortium were initially contacted and information collected on variables recorded and animal databases available.

Collection of this data provides an insight into variables recorded at each research institute and this provides a centralised database of animal inventories at each research institute.

2 Objective

This deliverable falls under task 1.2 of WP1. The objective of task 1.2 was to describe and map research animal databases and existing sample banks, and their accessibility across the participating organisations.

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 variables recorded and animal databases at each research institute was developed and an excel spread sheet created to collect the data. The different headings under which extensive information was required were as follows:

- milking and milk analysis facilities and equipment
- bodyweight and body condition score (BCS)
- blood sample analysis
- thermography
- feed dry matter intake (DMI)
- methane measurements
- animal behaviour
- fertility measurements
- digestive system analysis
- near infrared spectroscopy (NIRS)
- freeze drying
- meat characteristics

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

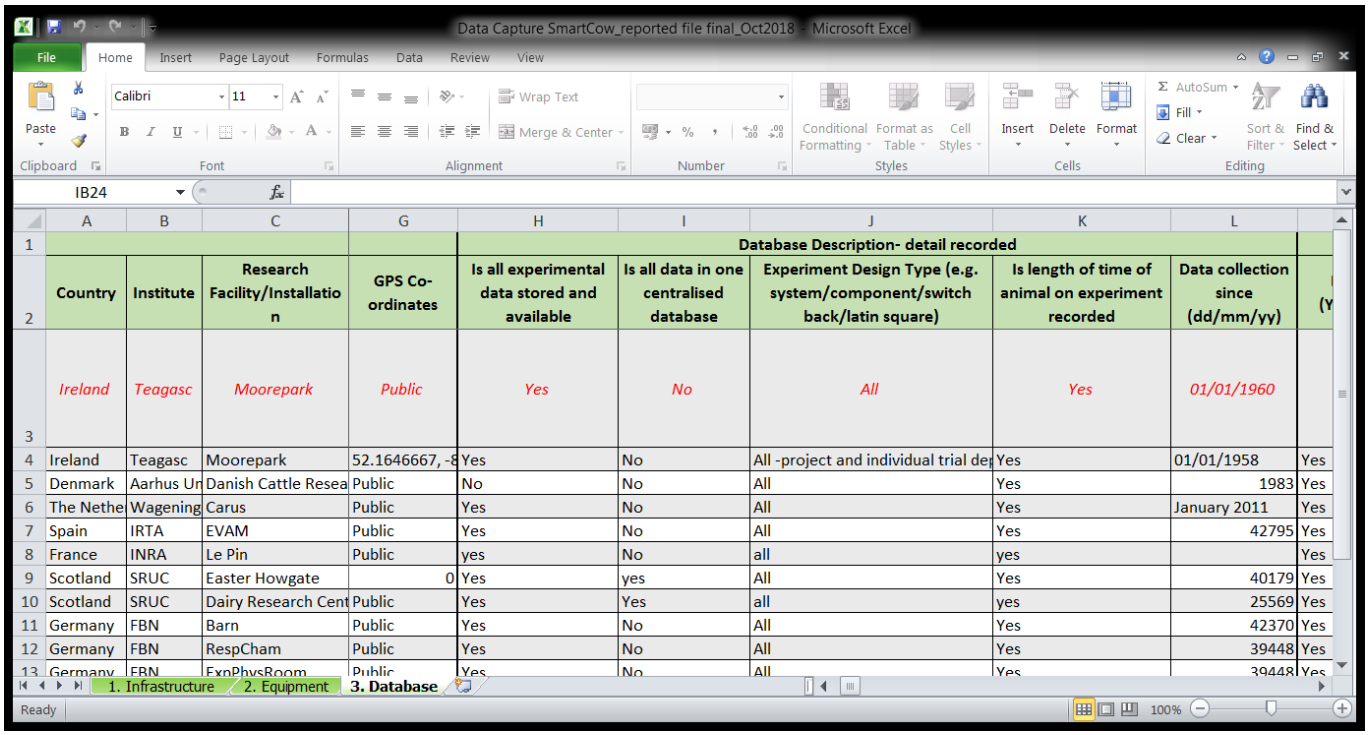
- weather stations
- water quality
- feed and intake
- sample storage

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 these sub-committee were satisfied with database, it was sent to the people within the consortium whose email addresses were collected at the kick off meeting.

(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 in regards to animal databases and variables recorded each research institute.



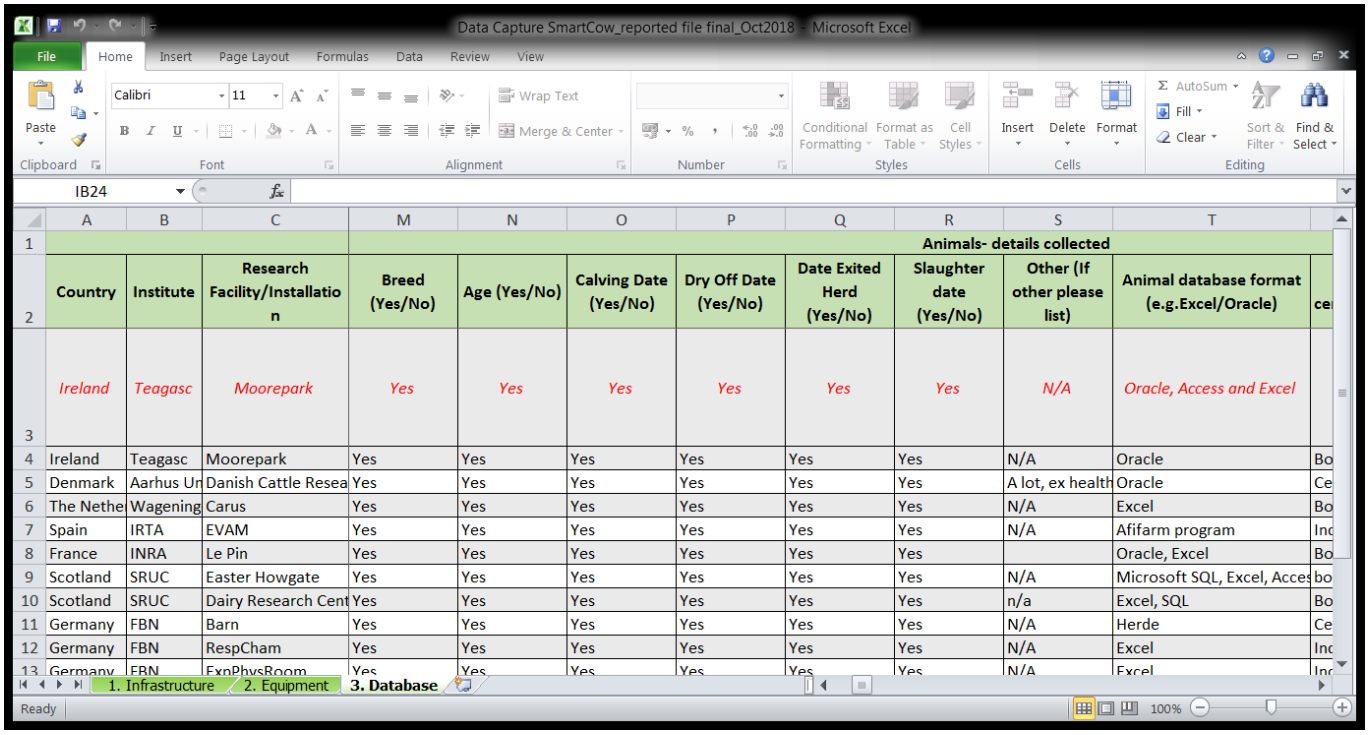
Data Capture SmartCow_reported file final_Oct2018 - Microsoft Excel

	A	B	C	G	H	I	J	K	L	
1					Database Description- detail recorded					
2	Country	Institute	Research Facility/Installation	GPS Co-ordinates	Is all experimental data stored and available	Is all data in one centralised database	Experiment Design Type (e.g. system/component/switch back/latin square)	Is length of time of animal on experiment recorded	Data collection since (dd/mm/yy)	(Y
3	*Ireland*	*Teagasc*	*Moorepark*	*Public*	*Yes*	*No*	*All*	*Yes*	*01/01/1960*	
4	Ireland	Teagasc	Moorepark	52.1646667, -8	Yes	No	All -project and individual trial de	Yes	01/01/1958	Yes
5	Denmark	Aarhus Un	Danish Cattle Resea	Public	No	No	All	Yes	1983	Yes
6	The Nethe	Wagening	Carus	Public	Yes	No	All	Yes	January 2011	Yes
7	Spain	IRTA	EVAM	Public	Yes	No	All	Yes	42795	Yes
8	France	INRA	Le Pin	Public	yes	No	all	yes		Yes
9	Scotland	SRUC	Easter Howgate	0	Yes	yes	All	Yes	40179	Yes
10	Scotland	SRUC	Dairy Research Cent	Public	Yes	Yes	all	yes	25569	Yes
11	Germany	FBN	Barn	Public	Yes	No	All	Yes	42370	Yes
12	Germany	FBN	RespCham	Public	Yes	No	All	Yes	39448	Yes
13	Germany	FBN	ExpPhysRoom	Public	Yes	No	All	Yes	39448	Yes

1. Infrastructure | 2. Equipment | 3. Database

Figure 1. List of research institutes and the database descriptions at these institutes

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

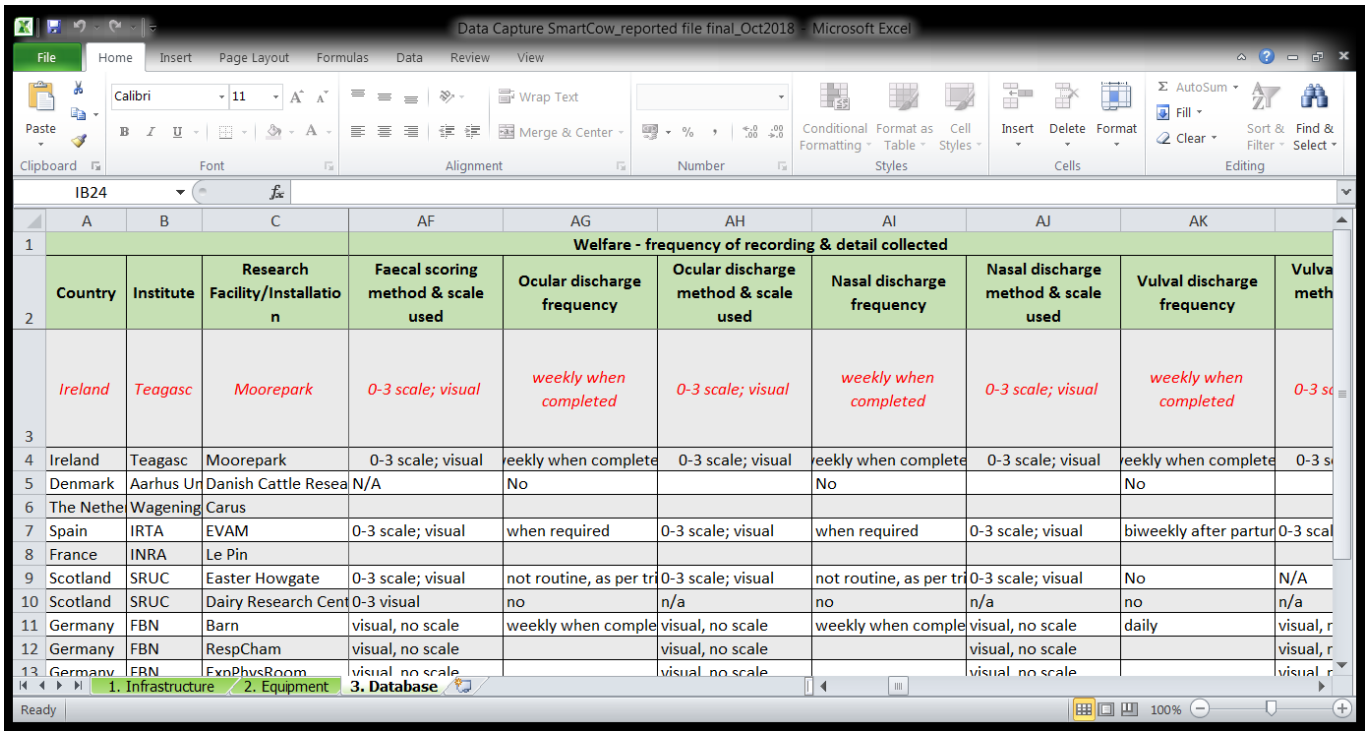


Data Capture SmartCow_reported file final_Oct2018 - Microsoft Excel

	A	B	C	M	N	O	P	Q	R	S	T
1				Animals- details collected							
2	Country	Institute	Research Facility/Installation	Breed (Yes/No)	Age (Yes/No)	Calving Date (Yes/No)	Dry Off Date (Yes/No)	Date Exited Herd (Yes/No)	Slaughter date (Yes/No)	Other (If other please list)	Animal database format (e.g.Excel/Oracle)
3	*Ireland*	*Teagasc*	*Moorepark*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*N/A*	*Oracle, Access and Excel*
4	Ireland	Teagasc	Moorepark	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Oracle
5	Denmark	Aarhus Un	Danish Cattle Resea	Yes	Yes	Yes	Yes	Yes	Yes	A lot, ex health	Oracle
6	The Nethe	Wagening	Carus	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Excel
7	Spain	IRTA	EVAM	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Afifarm program
8	France	INRA	Le Pin	Yes	Yes	Yes	Yes	Yes	Yes		Oracle, Excel
9	Scotland	SRUC	Easter Howgate	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Microsoft SQL, Excel, Acces
10	Scotland	SRUC	Dairy Research Cent	Yes	Yes	Yes	Yes	Yes	Yes	n/a	Excel, SQL
11	Germany	FBN	Barn	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Herde
12	Germany	FBN	RespCham	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Excel
13	Germany	FBN	ExpPhysRoom	Yes	Yes	Yes	Yes	Yes	Yes	N/A	Excel

1. Infrastructure | 2. Equipment | 3. Database

Figure 2. List of research institutes and the animal details collected at these institutes



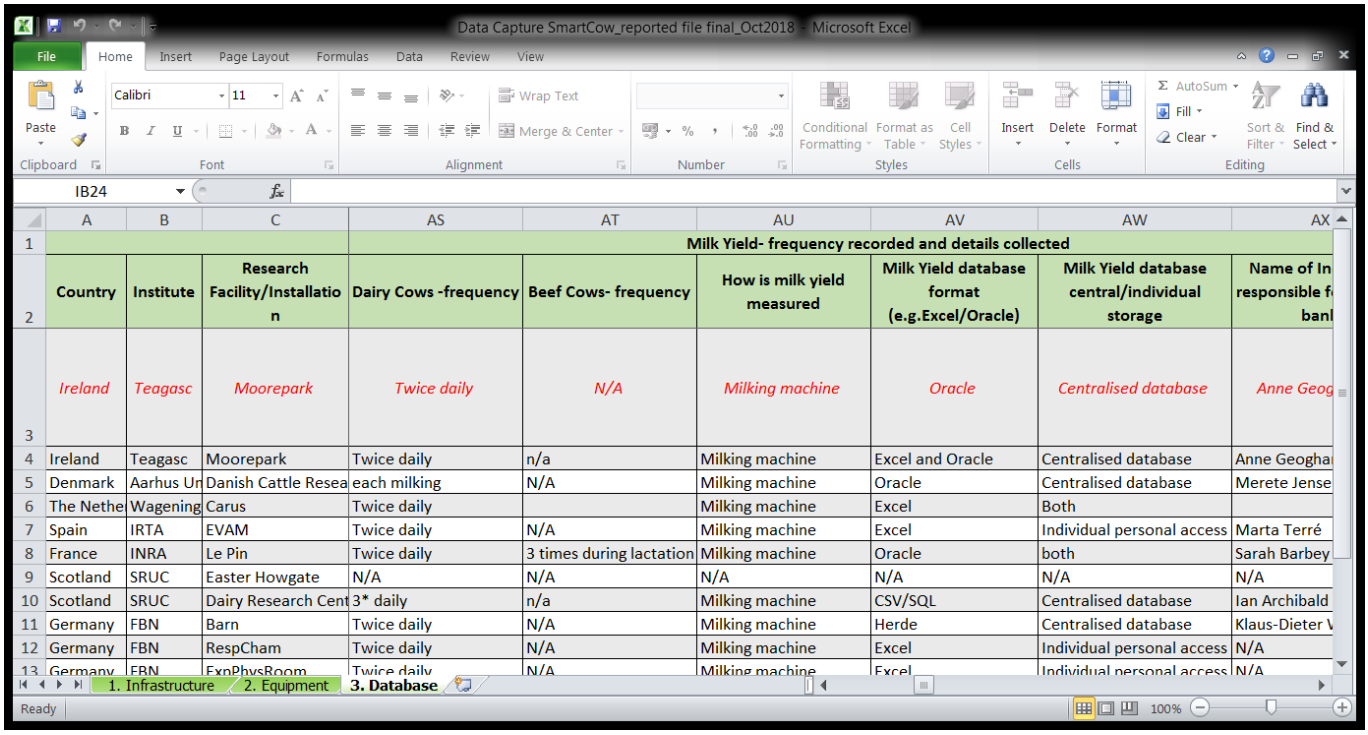
Data Capture SmartCow_reported file final_Oct2018 - Microsoft Excel

	A	B	C	AF	AG	AH	AI	AJ	AK
1				Welfare - frequency of recording & detail collected					
2	Country	Institute	Research Facility/Installation	Faecal scoring method & scale used	Ocular discharge frequency	Ocular discharge method & scale used	Nasal discharge frequency	Nasal discharge method & scale used	Vulval discharge frequency
3	*Ireland*	*Teagasc*	*Moorepark*	*0-3 scale; visual*	*weekly when completed*	*0-3 scale; visual*	*weekly when completed*	*0-3 scale; visual*	*weekly when completed*
4	Ireland	Teagasc	Moorepark	0-3 scale; visual	eekly when complete	0-3 scale; visual	eekly when complete	0-3 scale; visual	eekly when complete
5	Denmark	Aarhus Un	Danish Cattle Resea	N/A	No		No		No
6	The Nethe	Wagening	Carus						
7	Spain	IRTA	EVAM	0-3 scale; visual	when required	0-3 scale; visual	when required	0-3 scale; visual	biweekly after partur
8	France	INRA	Le Pin						
9	Scotland	SRUC	Easter Howgate	0-3 scale; visual	not routine, as per tri	0-3 scale; visual	not routine, as per tri	0-3 scale; visual	No
10	Scotland	SRUC	Dairy Research Cent	0-3 visual	no	n/a	no	n/a	no
11	Germany	FBN	Barn	visual, no scale	weekly when comple	visual, no scale	weekly when comple	visual, no scale	daily
12	Germany	FBN	RespCham	visual, no scale		visual, no scale		visual, no scale	
13	Germany	FBN	ExpPhysRoom	visual, no scale		visual, no scale		visual, no scale	

1. Infrastructure | 2. Equipment | 3. Database

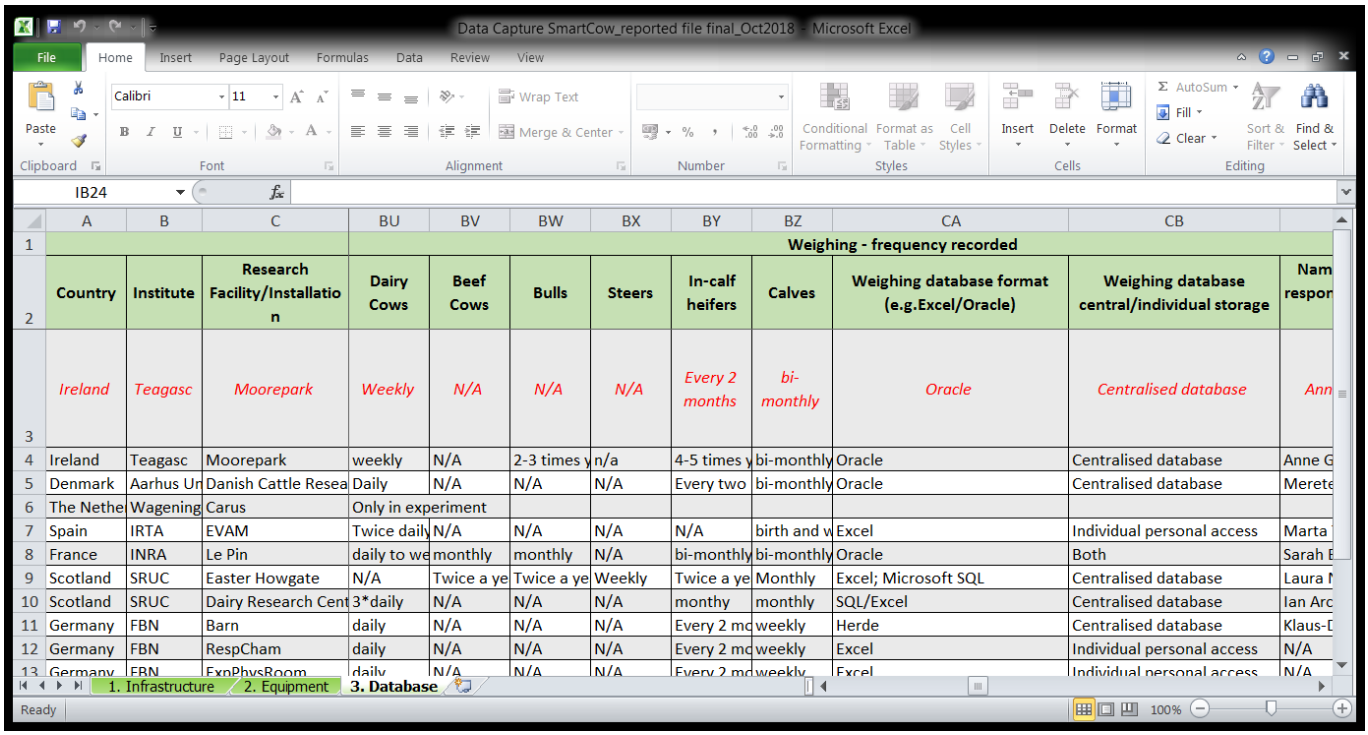
Figure 3. List of research institutes and the frequency of recording and details collected in regards welfare measurements

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



	A	B	C	AS	AT	AU	AV	AW	AX
1				Milk Yield- frequency recorded and details collected					
2	Country	Institute	Research Facility/Installation	Dairy Cows -frequency	Beef Cows- frequency	How is milk yield measured	Milk Yield database format (e.g.Excel/Oracle)	Milk Yield database central/individual storage	Name of In responsible f banl
3	*Ireland*	*Teagasc*	*Moorepark*	*Twice daily*	*N/A*	*Milking machine*	*Oracle*	*Centralised database*	*Anne Geog*
4	Ireland	Teagasc	Moorepark	Twice daily	n/a	Milking machine	Excel and Oracle	Centralised database	Anne Geogha
5	Denmark	Aarhus Un	Danish Cattle Resea	each milking	N/A	Milking machine	Oracle	Centralised database	Merete Jense
6	The Nethe	Wagening	Carus	Twice daily		Milking machine	Excel	Both	
7	Spain	IRTA	EVAM	Twice daily	N/A	Milking machine	Excel	Individual personal access	Marta Terré
8	France	INRA	Le Pin	Twice daily	3 times during lactation	Milking machine	Oracle	both	Sarah Barbey
9	Scotland	SRUC	Easter Howgate	N/A	N/A	N/A	N/A	N/A	N/A
10	Scotland	SRUC	Dairy Research Cent	3* daily	n/a	Milking machine	CSV/SQL	Centralised database	Ian Archibald
11	Germany	FBN	Barn	Twice daily	N/A	Milking machine	Herde	Centralised database	Klaus-Dieter V
12	Germany	FBN	RespCham	Twice daily	N/A	Milking machine	Excel	Individual personal access	N/A
13	Germany	FBN	ExpPhysRoom	Twice daily	N/A	Milking machine	Excel	Individual personal access	N/A

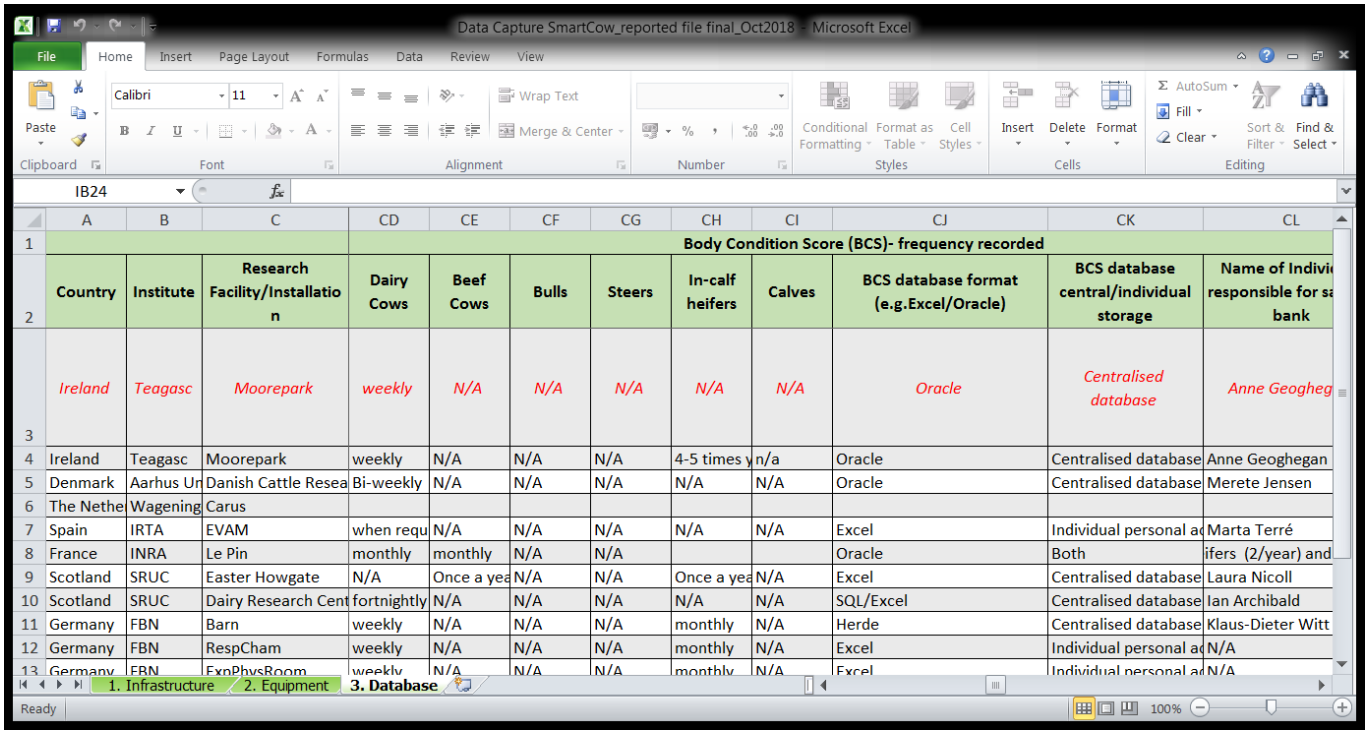
Figure 4. List of research institutes and the frequency of milk yield recording and details collected



	A	B	C	BU	BV	BW	BX	BY	BZ	CA	CB	
1				Weighing - frequency recorded								
2	Country	Institute	Research Facility/Installation	Dairy Cows	Beef Cows	Bulls	Steers	In-calf heifers	Calves	Weighing database format (e.g.Excel/Oracle)	Weighing database central/individual storage	Nam respor
3	*Ireland*	*Teagasc*	*Moorepark*	*Weekly*	*N/A*	*N/A*	*N/A*	*Every 2 months*	*bi-monthly*	*Oracle*	*Centralised database*	*Ann*
4	Ireland	Teagasc	Moorepark	weekly	N/A	2-3 times y	n/a	4-5 times y	bi-monthly	Oracle	Centralised database	Anne G
5	Denmark	Aarhus Un	Danish Cattle Resea	Daily	N/A	N/A	N/A	Every two	bi-monthly	Oracle	Centralised database	Merete
6	The Nethe	Wagening	Carus	Only in experiment								
7	Spain	IRTA	EVAM	Twice daily	N/A	N/A	N/A	N/A	birth and w	Excel	Individual personal access	Marta
8	France	INRA	Le Pin	daily to we	monthly	monthly	N/A	bi-monthly	bi-monthly	Oracle	Both	Sarah E
9	Scotland	SRUC	Easter Howgate	N/A	Twice a ye	Twice a ye	Weekly	Twice a ye	Monthly	Excel; Microsoft SQL	Centralised database	Laura M
10	Scotland	SRUC	Dairy Research Cent	3*daily	N/A	N/A	N/A	monthy	monthly	SQL/Excel	Centralised database	Ian Arc
11	Germany	FBN	Barn	daily	N/A	N/A	N/A	Every 2 mo	weekly	Herde	Centralised database	Klaus-D
12	Germany	FBN	RespCham	daily	N/A	N/A	N/A	Every 2 mo	weekly	Excel	Individual personal access	N/A
13	Germany	FBN	ExpPhysRoom	daily	N/A	N/A	N/A	Every 2 mo	weekly	Excel	Individual personal access	N/A

Figure 5. List of research institutes and the frequency of recording of animal weights at these institutes

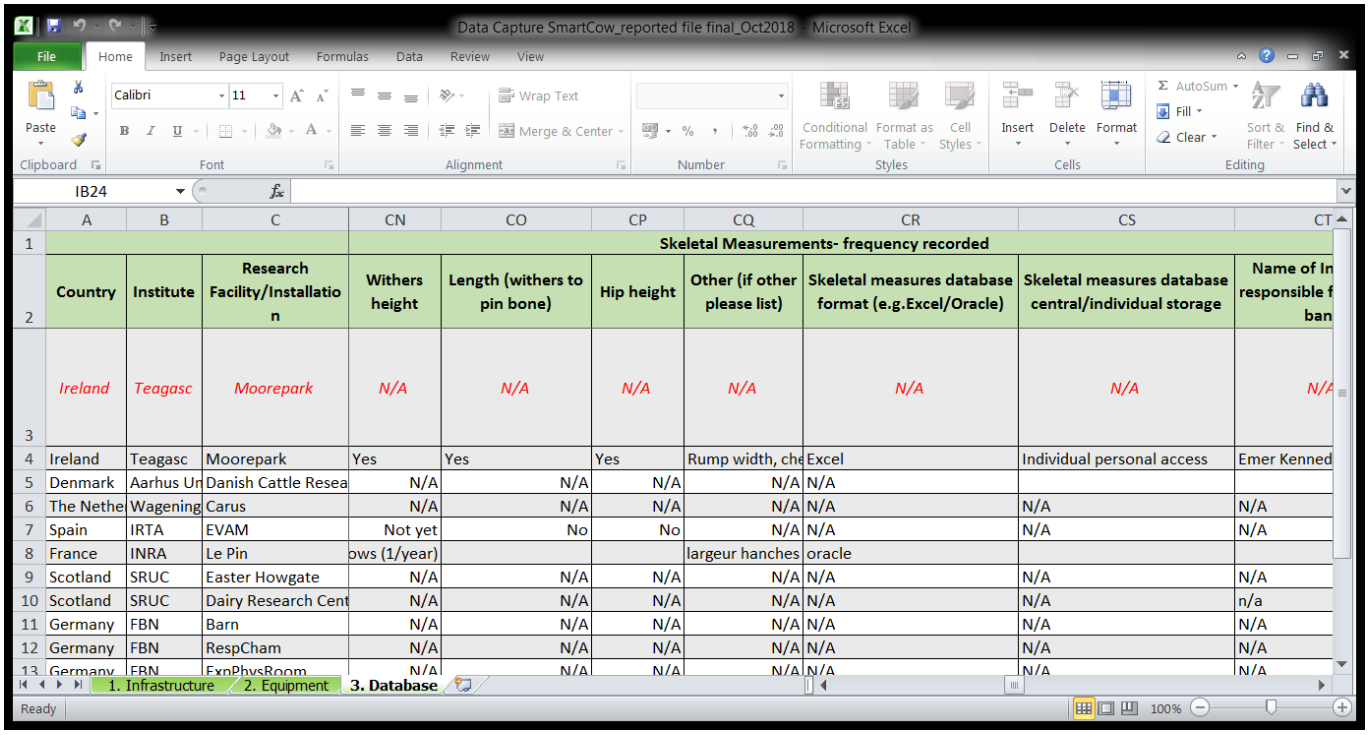
This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement N°730924



Data Capture SmartCow_reported file final_Oct2018 - Microsoft Excel

	A	B	C	CD	CE	CF	CG	CH	CI	CJ	CK	CL
1				Body Condition Score (BCS)- frequency recorded								
2	Country	Institute	Research Facility/Installation	Dairy Cows	Beef Cows	Bulls	Steers	In-calf heifers	Calves	BCS database format (e.g.Excel/Oracle)	BCS database central/individual storage	Name of Indivi responsible for sa bank
3	*Ireland*	*Teagasc*	*Moorepark*	*weekly*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*Oracle*	*Centralised database*	*Anne Geoghe*
4	Ireland	Teagasc	Moorepark	weekly	N/A	N/A	N/A	4-5 times y	n/a	Oracle	Centralised database	Anne Geoghegan
5	Denmark	Aarhus Un	Danish Cattle Resea	Bi-weekly	N/A	N/A	N/A	N/A	N/A	Oracle	Centralised database	Merete Jensen
6	The Nethe	Wagening	Carus									
7	Spain	IRTA	EVAM	when requ	N/A	N/A	N/A	N/A	N/A	Excel	Individual personal ac	Marta Terré
8	France	INRA	Le Pin	monthly	monthly	N/A	N/A			Oracle	Both	ifers (2/year) and
9	Scotland	SRUC	Easter Howgate	N/A	Once a yea	N/A	N/A	Once a yea	N/A	Excel	Centralised database	Laura Nicoll
10	Scotland	SRUC	Dairy Research Cent	fortnightly	N/A	N/A	N/A	N/A	N/A	SQL/Excel	Centralised database	Ian Archibald
11	Germany	FBN	Barn	weekly	N/A	N/A	N/A	monthly	N/A	Herde	Centralised database	Klaus-Dieter Witt
12	Germany	FBN	RespCham	weekly	N/A	N/A	N/A	monthly	N/A	Excel	Individual personal ac	N/A
13	Germany	FBN	ExpPhysRoom	weekly	N/A	N/A	N/A	monthly	N/A	Excel	Individual personal ac	N/A

Figure 6. List of research institutes and the frequency of measurment of body condition score of the animals at these institutes



Data Capture SmartCow_reported file final_Oct2018 - Microsoft Excel

	A	B	C	CN	CO	CP	CQ	CR	CS	CT
1				Skeletal Measurements- frequency recorded						
2	Country	Institute	Research Facility/Installation	Withers height	Length (withers to pin bone)	Hip height	Other (if other please list)	Skeletal measures database format (e.g.Excel/Oracle)	Skeletal measures database central/individual storage	Name of In responsible f ban
3	*Ireland*	*Teagasc*	*Moorepark*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
4	Ireland	Teagasc	Moorepark	Yes	Yes	Yes	Rump width, che	Excel	Individual personal access	Emer Kenned
5	Denmark	Aarhus Un	Danish Cattle Resea	N/A	N/A	N/A	N/A	N/A		
6	The Nethe	Wagening	Carus	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	Spain	IRTA	EVAM	Not yet	No	No	N/A	N/A	N/A	N/A
8	France	INRA	Le Pin	ows (1/year)			largeur hanches	oracle		
9	Scotland	SRUC	Easter Howgate	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10	Scotland	SRUC	Dairy Research Cent	N/A	N/A	N/A	N/A	N/A	N/A	n/a
11	Germany	FBN	Barn	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12	Germany	FBN	RespCham	N/A	N/A	N/A	N/A	N/A	N/A	N/A
13	Germany	FBN	ExpPhysRoom	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Figure 7. List of research institutes and the details collected on skeletal measurements at these institutes

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

4 Results and Implications

An inventory of the animal databases employed in SmartCow participating organisations was developed, including an account of variables recorded in each research institute. As a result SmartCow now has a comprehensive catalogue of all the available animal databases and related methodologies within each of the consortium research institutes.

Once the data collection process is streamlined and dissemination methods agreed and created, other EU research institutes and eventually research institutes outside of the EU can also be included. Into the future the database created can also be sent to research institutes outside of the SmartCow consortium to garner further information regarding animal databases and related methodologies within their research institutes. This will allow a more exhaustive list of animal databases and methodologies 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.

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