SCIENCE | UNIT OF STUDY 2

✱ Year 11 ✱ NCEA AS90949 ✱ Level 1.10 ✱ Credits 4 ✱ Duration 2 Weeks

THIS UNIT
- *Supports internal assessment for Achievement Standard 90949*
- *Investigates life processes and environmental factors that affect them*

'Normal Behaviour' in Factory Farms

Investigate what constitutes 'normal behaviour' in pigs and chickens and how the confined living environment in factory farms affects these behaviours

TEACHER GUIDELINES

The following guidelines are supplied to enable teachers to carry out valid and consistent assessment using this internal assessment resource.

Teachers need to be very familiar with the outcome being assessed by Achievement Standard Science 90949. The achievement criteria and the explanatory notes contain information, definitions and requirements that are crucial when interpreting the standard and assessing students against it.

CONTEXT/SETTING

This activity requires students to investigate two life processes relating to whether (and how) the restrictive physical environment of a factory farm manifests in physical, behavioural and psychological issues for animals confined in cages or crates. The processes that will be investigated are:

- Support and movement (physical biological behavioural needs – in particular, the inability to exercise) in mammals and birds. What happens to the muscles, bones, skin and feathers of mammals and birds when they are unable to exercise adequately?
- Sensitivity (psychological biological needs – the suppression of which can lead to chronic situational depression or adjustment disorder and stereotypical behaviours) in mammals and birds. What happens psychologically to mammals and birds when they are not stimulated socially and emotionally by their living environment?

The task involves practical investigation, interpretation, producing and labelling biological drawings, and the relating of biological ideas to the observations and findings.

The animals most typically kept on factory farms are pigs and chickens. Students may base their findings on these animals or they may undertake a more generic study of the physical biological behavioural and psychological biological needs of mammals and/or birds.

Annotated diagrams and drawings can provide some evidence in this assessment. Note that 'annotation' of a diagram or drawing includes not only labels to identify component parts but also descriptions of colour, textures and so on, and explanations of 'basic behavioural needs', both individually and together. Hence, annotated diagrams can provide evidence towards Achieved and Merit. Effective annotation is a skill that needs to be overtly taught and practised by students during the learning stage.

CONDITIONS

Allocate four to five hours to complete the task.

Investigation of the exercise/social/behavioural requirements of mammals and birds will take approximately one hour:

- Comparative ethograms that show the physical differences between long-term confinement and free-roaming situations.
- Diagrams that show the physical effects of long-term inactivity (muscle atrophy, lameness, weight gain or loss, pressure sores, feather loss, cannibalism, etc).
- Charts that describe depressive behaviour (fatigue, lack of energy, agitation, slow movements, lack of responsiveness, stereotypic behaviours).

Students are required to record observations (from photos and video footage) and write about how confinement in cages and crates impacts, physically and psychologically, on the behaviour of mammals and birds.

Students then use their observations, ethograms and other resources to write about each of the life processes and an environmental factor that affects each (EN 3, 4 and 5).

Students could use their observations and findings from a fair test investigation carried out for Achievement Standard Biology 90925 *Carry out a practical investigation in a biological context, with direction* to provide evidence for either task, as long as it is in the context of the life processes being investigated for Achievement Standard 90949.

The practical investigations can be carried out in pairs, but the written part is an individual task. The resource-based activities are also to be carried out individually. It is expected that students would have covered the key ideas about support and movement and sensitivity in mammals and birds as part of their teaching and learning programme.

Life processes may be selected from: support and movement, reproduction, sensitivity, growth, excretion, nutrition and gas exchange. At least two of these processes must be selected (EN 6).

Environmental factors that affect life processes may be internal or external and may include: temperature, pH, light intensity, photoperiod, moisture levels, concentration of gases, hormone levels and nutrient supply (EN 7).

Biological ideas relating to a life process include the following (EN 8):

- structural features of the organism, such as its organ system or tissues as appropriate to the organism
- functioning of the components of any organ system or tissues
- identifying the biological processes carried out by the organ system or tissues
- environmental factors that affect the life processes.

RESOURCE REQUIREMENTS

Students will need access to the following resources in order to complete the activity:

- Internet access
- Video footage and photographs of pigs and chickens confined in crates and cages
- Video footage and photographs of pigs and chickens living in free-roaming situations
- Books and articles that describe the social and behavioural needs of mammals and birds
- Ethograms that depict normal behaviour in mammals and birds.

NOTE: Some resource materials showing animals in cages and crates may be upsetting to the more sensitive members of your class.

ACHIEVEMENT CRITERIA

Achievement	Achievement with Merit	Achievement with Excellence
Investigate life processes and environmental factors that affect them.	Investigate, **in depth**, life processes and environmental factors that affect them.	Investigate, **comprehensively**, life processes and environmental factors that affect them.

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NOTE

The New Zealand Animal Welfare Act 1999 specifies that, when responsible for an animal, people must provide for their physical, health and behavioural needs by ensuring the animal has the 'opportunity to display normal patterns of behaviour'.

Source: Animal Welfare Act 1999, section 4

www.legislation.govt.nz/act/public/1999/0142/latest/DLM50286.html

Retrieved 20 March 2015

As a result of this debate PIANZ (Poultry Industry Association of New Zealand) has introduced a new 'enriched' cage for layer hens called a colony cage.

INTRODUCTION

The debate surrounding the welfare of animals in factory farms has hinged on whether or not the animals have the opportunity to display normal patterns of behaviour (see note at left).

WHAT ARE THE LIVING CONDITIONS OF CHICKENS AND PIGS IN FACTORY FARMS?

Colony cage stocking densities

- Must be a minimum of 750cm^2 per hen or 13 hens per m^2.

Source: Animal Welfare (Layer Hens) Code of Welfare 2012 p. 16

Colony cage dimensions (see diagram p. 23)

- 300cm length
- 150cm width
- 45cm height

Farrowing crate dimensions (see diagram p. 24)

- 210-235cm length
- 70-90cm width
- 90cm height

Sow crates were banned from 2016 but farrowing crates remain legal.

NOTE: This is the space allocated for the sow only, not sow and piglets.

Source: PigCare Farrowing Assessment May 2011, www.freshporkfarmers.co.nz/audit/3_farrowing.pdf (retrieved 23 November 2015)

INTRODUCTION CONTINUED

Colony cages and farrowing crates are legal despite the Animal Welfare Act specifying that animals need to have the opportunity to display 'normal patterns of behaviour'.

Scientists are regularly asked to weigh into this debate in order to prove whether or not animal welfare is compromised in these situations. This task asks you to investigate whether these two farming systems (colony cages and farrowing crates) allow hens and pigs to behave 'normally'.

TEACHER NOTE

Insert time allowances for each task. Specify the resources being provided (e.g. ethograms, video footage and reading texts).

QUESTIONS TO ANSWER

- What is 'normal' behaviour for pigs and chickens?
- How much and what kind of physical exercise do pigs and chickens require to remain healthy?
- What kind of temperament does the animal have (in relation to visual, auditory and sensory stimuli)?
- What are the normal 'home ranges' of pigs and chickens?
- How important (psychologically) are nest building, dust or mud bathing and social relationships to pigs and chickens?
- What evidence is there that animals placed in extreme confinement suffer from depression and anxiety?

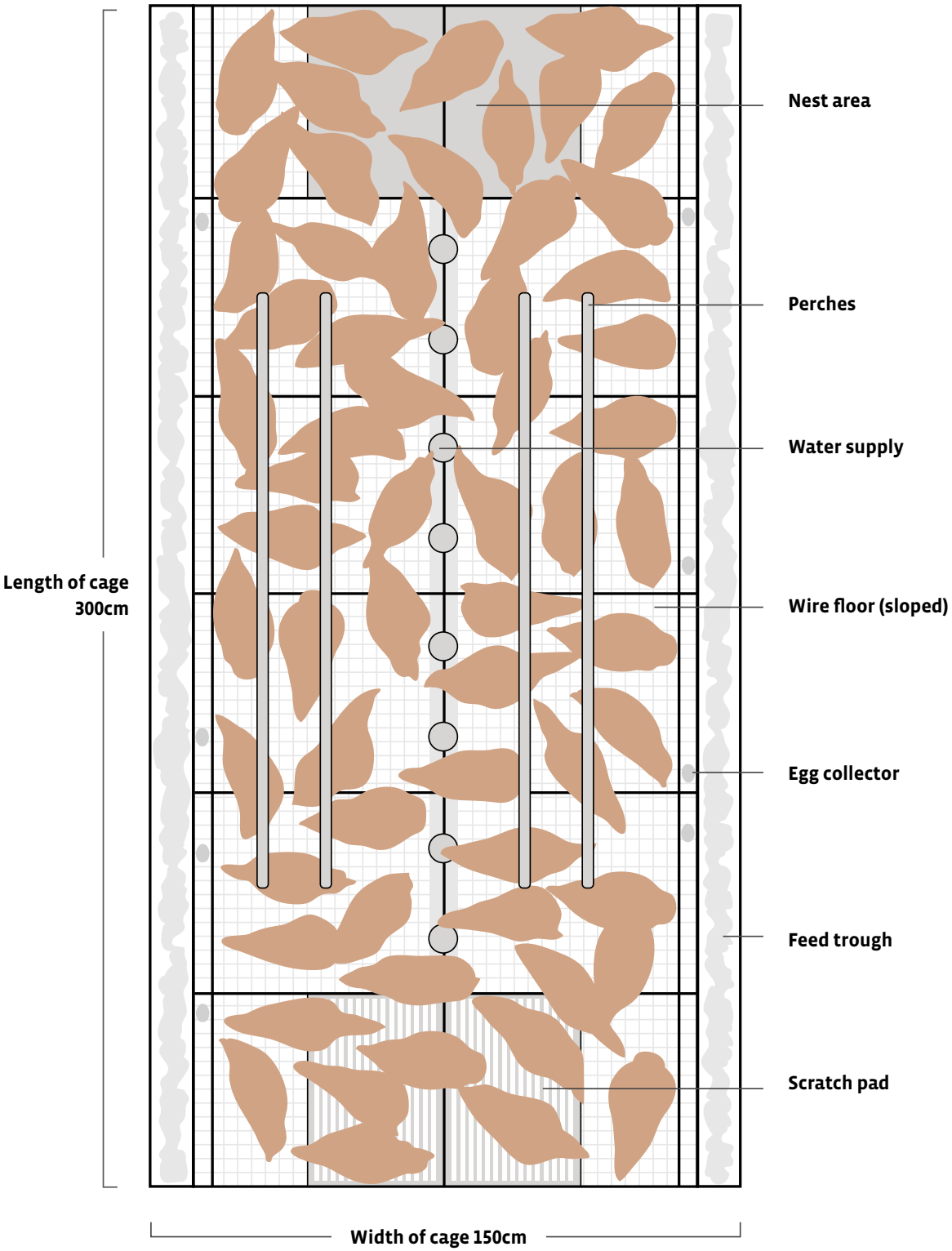
This task requires you to investigate two life processes in an animal context and the environmental factors that affect them.

These are 'support and movement' and 'sensitivity'. The environmental factor is 'restraint of movement'.

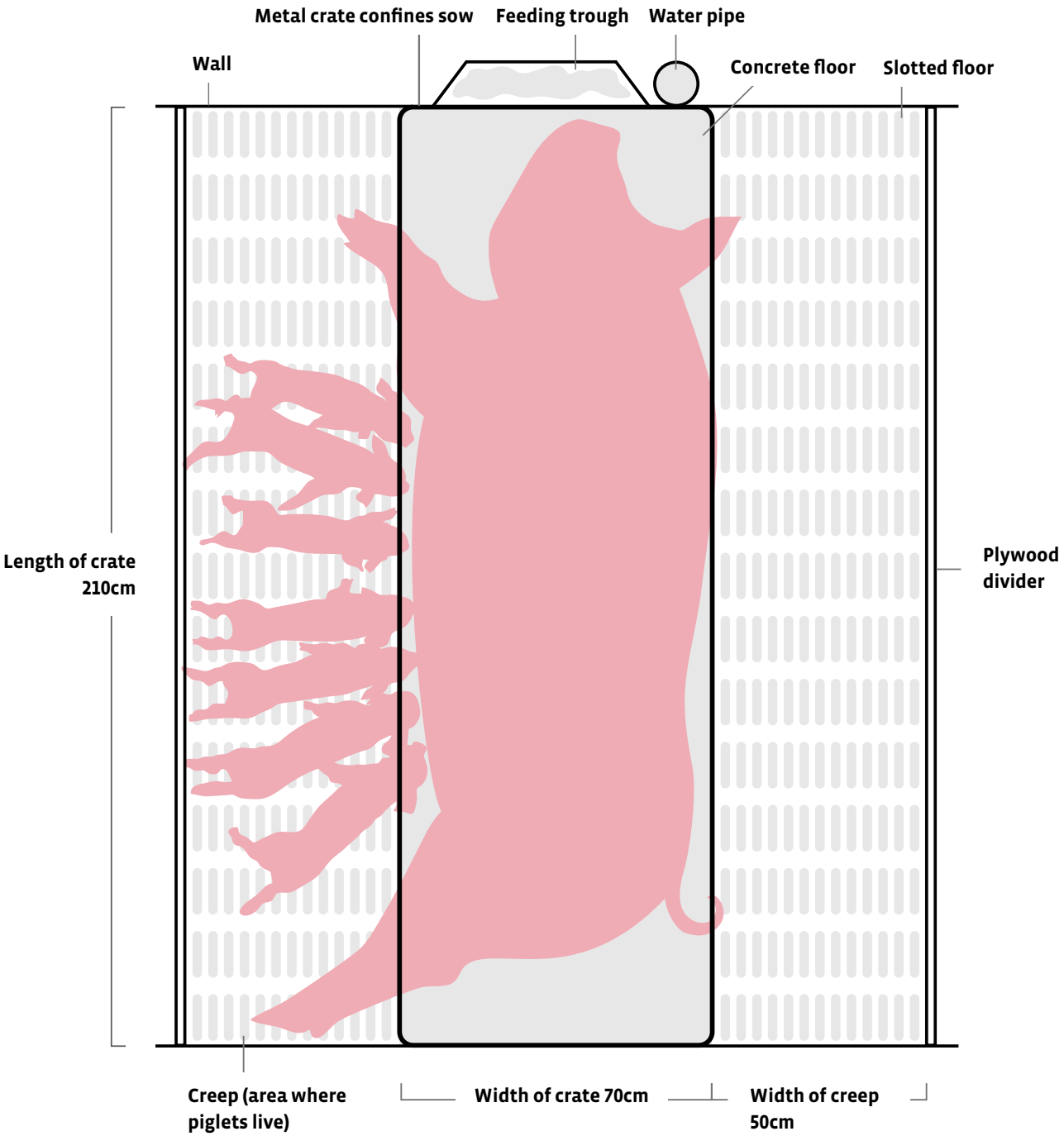
- **Support and movement** (physical biological behavioural needs – in particular, the inability to exercise) in mammals and birds. What happens to the physiology of mammals and birds when they are unable to exercise or move around adequately?
- **Sensitivity** (psychological biological needs – the suppression of which can lead to chronic situational depression or adjustment disorder and stereotypical behaviours) in mammals and birds. What happens psychologically to mammals and birds when they are not stimulated socially and emotionally by their living environment?

The practical investigations can be carried out in pairs but all other work, including the annotation of drawings and diagrams, is individual.

Colony Layer Hen Cage Illustration (750cm² per bird = 150cm x 300cm)



Farrowing Crate Illustration (210cm length, 70cm width, 90cm height)



TASK

There are several parts to this task. Complete all parts.

INVESTIGATION OF 'NORMAL BEHAVIOUR'

Use the ethograms provided to collect, record and graph data on normal behaviours in pigs and chickens. You can use the observational footage provided on the *Animals in Factory Farms* DVD.

Behaviour Sampling

Behaviour can be observed in two main ways: physical, relating to movement; and emotional, in relation to responses and interactions with others and/or the environment. A physical movement can be restricted or modified due to environment; an emotional reaction may also occur due to stress or distress caused by physical or social environments.

All animals have a behavioural 'repertoire': a set of behaviours that are common to that animal. These could be grooming, dust bathing, foraging, pecking or digging. Some behaviours (sleeping) are continuous; others are repeated sequences (pecking). A series of ethograms has been created for you to use that contains some of the most common behaviours for hens and pigs. These have been applied to the two different circumstances for each set of animals (living outdoors or living inside a factory farm). When collating your data you will be looking for 'action patterns'. These are series of behaviours that the animal makes during the observation period. You will be comparing behaviours and action patterns from the animals living in factory farms with the animals living outdoors in a more natural setting.

Things to consider are:

- the presence or absence of a particular action/activity
- how frequently an action/activity occurs
- how long an action/activity occurs
- whether there are any factors that affect the timing of the action/activity
- how intense or apathetic the action/activity is.

PART 1: COLLATE YOUR DATA

There are a number of ways you can collate your data. Examples have been provided of how you can collate your results. It is possible to do this in a variety of ways:

Behaviour sampling (conspicuous behaviour recording) = looking for only one or two kinds of behaviour. This is useful when looking for rare behaviours.

Point sampling (instantaneous sampling) = recording behaviours that happen at regular, predetermined points in time (e.g. every 15 seconds). This method can allow a number of activities to be recorded if numerous individuals are being observed, but can miss some behaviours.

Period occurrence (one-zero sampling) = recording behaviours that occur within a set period of time (e.g. during a ten-minute time period). This method can also allow a number of activities and individuals to be observed and can capture rare behaviours. Depending on the period of time some behaviours may be missed.

TASK CONTINUED

PART 2: DATA ANALYSIS

Use the chi-square test to identify significant differences between the behaviours of the animals in factory farms and those living outdoors.

$$X^2 = \sum \frac{(o-e)^2}{e}$$

where

X^2 is Chi-squared,
$\sum$ stands for summation,
o is the observed values, and
e is the expected values.

Observation Footage on DVD

- **Non-Caged Hen**
  Hen at The Animal Sanctuary at Matakana
  (Raw footage filmed on 11 June 2015)
  Footage of a hen called Blue who lives at The Animal Sanctuary. This footage was filmed over one day and has been edited into 110 15-second fragments.
  (Duration 27 min 44 sec)

Observation Footage on DVD

- **Non-Crated Pig**
  Pig at The Animal Sanctuary at Matakana
  (Raw footage filmed on 11 June 2015)
  Footage of a pig called Jose who lives at The Animal Sanctuary. This footage was filmed over one day and has been edited into 110 15-second fragments.
  (Duration 27 min 30 sec)

Observation Footage on DVD

- **Caged Hens**
  Hens in a New Zealand colony cage system
  (Raw footage filmed on 28 June 2015)
  Footage of layer hens in a colony cage on a New Zealand factory farm. This footage was filmed over one day and has been edited into 84 15-second fragments.
  (Duration 24 min 14 sec)

Observation Footage on DVD

- **Crated Pigs**
  Pigs in farrowing crates on Blantyre Farms, NSW, Australia
  (Raw footage filmed in April 2013)
  Footage of sows and piglets in farrowing crates on an Australian factory farm.
  (Duration 22 min 56 sec)

TEACHER NOTE

Students could use their observations and findings from a fair test investigation carried out for Achievement Standard Biology 90925 'Carry out a practical investigation in a biological context, with direction'.

Descriptive Ethogram of the Domestic Hen

Table 1. Behaviours that are possible in both cages and outdoors

Behaviour	Description
Displace (DP)	The bird pushes past another hen and takes her place.
Head flick (HF)	The bird remains immobile except for the head moving to the side or up and down; the neck remains relatively still.
Mounting (MT)	The bird climbs onto the back of another bird.
Resting (RT)	An apparent sleepy state with eyes closed. Usually performed while sitting but sometimes while standing.
Ruffling feathers (RF)	Action of ruffling or shaking all feathers.
Sitting (SG)	The bird remains in a sitting position for at least five seconds.
Standing (ST)	The bird remains immobile and erect for at least five seconds.

Table 2. Behaviours that are limited but possible in cages

Behaviour	Description
Avoidance (AV)	The bird changes direction in order to avoid another bird.
Lying down (LD)	The bird sits or lies down on the ground.
Opening wings (OW)	The bird flaps both wings.
Perching (PC)	The bird sits or stands on a perch.
Preening (PN)	The bird grooms her feathers with her beak.
Stretching (SH)	The bird stretches one wing and one leg from the same side.
Walking (WK)	The bird walks from one point to another.

Table 3. Behaviours that can be difficult or impossible to carry out in a cage

Behaviour	Description	
Bob (BB)	The bird repetitively moves the head and neck backwards and forwards (usually while walking or prior to laying an egg).	
Chasing (CH)	One bird chases after another in an aggressive manner.	
1. Dust bathing (DB) or 2. Sham dust bathing (SDB)	1. The bird lowers her body into the soil and scratches with her feet to release dust up into her feathers. She ruffles her feathers and wings at the same time.	2. The bird lowers her body and mimics the movements consistent with dust bathing (scratching feet and ruffling feathers).
1. Foraging (FG) or 2. Sham forgaging (SFG)	1. Movement of scratching the ground backwards with her feet in search of food.	2. The bird extends her head towards the floor of the cage while standing or sitting so the head cannot be seen. (Note: This could be some kind of 'sham' foraging behaviour.)
Nesting (NT)	The bird retreats to a nesting area to lay an egg.	
Running (RN)	Movement of the bird between two points at high speed.	
Sun bathing (SB)	The bird lies on the ground and fans out one of her wings.	
Threatening (TH)	The bird targets another bird and chases her.	

Table 4. Behaviours that can become excessive in cage environments

Behaviour	Description	
Drinking (DK)	The bird drinks.	
Eating (ET)	The bird eats.	
1. Object peck (OP) or 2. Cage peck (CP)	1. The bird pecks at an object in her environment repeatedly that is not food, water, the ground or another bird.	2. The bird pecks at any object in the cage other than food, water, floor or another bird (often performed in a repetitive stereotyped manner).
Pecking (PK)	The bird aggressively pecks at any body part of another bird.	

Descriptive Ethogram of the Pig

Table 5. Behaviours that are possible in both crates and outdoors

Behaviour	Description
Chewing (CW)	The pig chews on food.
Drinking (DK)	The pig drinks.
Eating (ET)	The pig eats.
Nursing (NG)	The sow lies with piglets at her udders.
Resting (RT)	The pig lies still with eyes closed for at least five seconds.
Shakes (SK)	The pig shakes her body.
Sitting (SG)	The pig remains in a sitting position for at least five seconds.
Standing (ST)	The pig remains immobile and erect for at least five seconds.
Stretch (SH)	The pig stretches.
Yawns (YN)	The pig yawns.

Table 6. Behaviours that are limited but possible in crates

Behaviour	Description	
1. Exploring (EP) or 2. Sham exploring (SEP)	1. The pig smells and touches her surroundings with her nose.	2. The pig smells and touches her crate with her nose.
Greeting (GR)	Gentle touching of snouts or grunt of greeting.	
Itching (IT)	The pig scratches against an object.	

Table 7. Behaviours that can be difficult or impossible to carry out in a crate

Behaviour	Description
Chase (CH)	One pig chases after another.
Communal nesting (CN)	Pigs sleep on top of each other.
Fighting (FT)	One pig fights with another pig (aggressive biting, jumping on).
Foraging (FG)	The pig searches for food, sniffing the ground and upturning leaves and soil with her snout.
Mud bathing (MB)	The pig wallows in mud.
Nest building (NB)	The pregnant sow seeks out a secluded location and builds a nest from twigs and grass.
Nosing (NS)	The pig smells a newcomer to the group.
Playing (PY)	The pig plays with other pigs (non-aggressive ramming with head, lifting with snout).
Rooting (RO)	The pig uses her snout to upturn soil in search of food.
Running (RN)	Movement of the pig between two points at high speed.
Threatening (TH)	Dominant pig barks at subordinate pig.
Walking (WK)	The pig walks from one point to another.

Table 8. Behaviours only seen in crate environments

Behaviour	Description
Abnormal behaviour (AB)	Persistent biting of the ear or tail of another pig and bar biting.
Backing up (BU)	The pig backs up into the rear of the crate.
Difficult ascent (DA)	The pig moves awkwardly from lying to standing in an effort to avoid trampling on her piglets or due to leg weakness.
Difficult descent (DD)	The pig slowly moves awkwardly from standing to lying in an effort to avoid lying on top of her piglets.
Dog sitting (DS)	The pig lies in an abnormal position with her front legs low and extended and her rump elevated.
Food seeking (FS)	The pig places her head into empty feeder.
Head weaving (HW)	The pig repetitively rolls her head in circles.
Phantom rooting (PRT)	The pig repetitively makes an upward movement of her snout (mimicking the rooting up of soil in search of food).
Sham chewing (SC)	The pig chews on imaginary food source.
Unresponsive (UN)	The pig is unresponsive to direct stimuli.

Ethogram Results

Table 9. EXAMPLE of results table for domestic hen behaviour (caged or unconfined)

	Behaviour																											
Time (min/sec)	AV	BB	CH	CP	DB	DK	DP	ET	FG	HF	LD	W	PC	PK	PN	RF	RN	RT	SB	SDB	SFG	SG	SH	ST	TH	WK
0	x																									
0.15					x															x						
0.30	x																								x	
0.45							x																			
1											x														x	
1.15																										
1.30																		x								
1.45						x																	x			
2																										
2.15																									x	
2.30						x														x						
2.45																		x								
TOTAL	2				1	2	1				1							2		2			1		3	

Place an 'x' at the time the hen displays the coded behaviour.

Table 10. EXAMPLE of results table for domestic pig behaviour (crated or unconfined)

	Behaviour																											
Time (min/sec)	AB	BU	CH	CN	CW	DA	DD	DK	DS	EP	ET	FG	FS	FT	GR	HW	IT	MB	RT	PY	RN	RO	RT	SC	SEP	SG	SH	SK	ST	TH	WK	UN	YN
0												x																				x	
0.15												x									x												
0.30																x				x										x			
0.45								x																x									
1								x																				x					
1.15						x							x											x									
1.30													x																				
1.45		x																										x					
2		x																x							x								
2.15																x										x			x		x		
2.30																x																	
2.45																	x													x			
TOTAL		2				1		2				2	2			3	1	1						1	2	1		2	2	1		4	

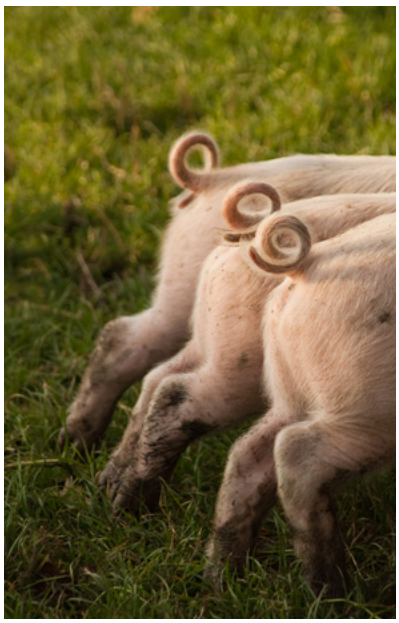
Place an 'x' at the time the pig displays the coded behaviour.

NOTE

Select up to four behaviours for each animal.

Expand these results tables to include more time as necessary.

Indicate whether the results are from caged, crated or unconfined animals.



PART 3: INVESTIGATION OF ANIMAL BEHAVIOUR

Tabulate your results and draw a graph of behaviour types for crated/caged and non-crated/caged animals.

Use your graphed data to interpret trends in behaviour.

Explain which behaviours are most prevalent in each situation, and how these behaviours contribute to the life processes of support and movement and sensitivity for the animals concerned.

PART 4: HEALTH AND WELL-BEING

Read the information about the physical and social needs of pigs and chickens (see recommended reading list on pages 31-32).

Describe the types of behaviour pigs and chickens need on a daily basis to remain physically and socially healthy.

Explain how the environmental constraint of crates or cages physically and psychologically impacts on the biological behavioural needs of pigs and chickens.

PART 5: NORMAL VS ABNORMAL BEHAVIOUR

Use your findings to discuss which behaviours are normal and which are abnormal (maladaptive or malfunctional). Explain the influence of environment in contributing to these behaviours.

PART 6: WELFARE AND THE LAW

Imagine you have been asked by the National Animal Welfare Advisory Committee (NAWAC) to provide scientific evidence on whether farrowing crates or colony cages meet the requirements of the Animal Welfare Act 1999 in regard to the opportunity for animals farmed in farrowing crates and colony cages to display normal patterns of behaviour.

Try to be impartial in regard to the species of animal (coming to the same conclusion regardless of whether the animal concerned is a pig or a dog, or a chicken or a kiwi) placed in this environment.

What would your conclusion be in regard to whether farrowing crates and colony cages meet the requirements of the Animal Welfare Act 1999 in regard to the animals' ability to display normal patterns of behaviour?

EXTENSION EXERCISE

Write a 750-word essay for NAWAC describing how intensive farming systems (farrowing crates and colony cages) impact physiologically and psychologically on hens and pigs. Use sources from the reading materials provided in this textbook to back up your arguments. Provide an ethical comment on the morality of intensive farming practices.

RESOURCES

EXTENDED WRITTEN TEXTS

Non-Fiction (extracts from)

p. 64 Appleby, Michael C., Mench, Joy A. and Hughes, Barry O. (2004). ***Poultry Behaviour and Welfare.***

p. 67 Broom, D.M. and Fraser, A.F. (2007). ***Domestic Animal Behaviour and Welfare.***

p. 81 Marchant-Forde, Jeremy N. (ed) (2009). ***The Welfare of Pigs.***

SHORT WRITTEN TEXTS

Government Publications

p. 112 National Animal Welfare Advisory Committee (NAWAC). ***Code of Welfare – Layer Hens*** (2012). NZ Government.

p. 114 National Animal Welfare Advisory Committee (NAWAC). ***Code of Welfare – Pigs*** (2010). NZ Government.

Journals

p. 121 Webster, A.B. and Hurnik, J.F. (1990). ***'An Ethogram of White Leghorn-Type Hens in Battery Cages'.*** *Canadian Journal of Animal Science*, Vol 70, Issue 3.

p. 124 Vieuille-Thomas, C., Le Pape, G. and Signoret, J.P. (1995). ***'Stereotypies in pregnant sows: indications of influence of the housing system on the patterns expressed by the animals'.*** *Applied Animal Behaviour Science*, Vol 44, Issue 1.

p. 128 Weaver, S.A. and Morris, M.C. (2004). ***'Science, Pigs, and Politics: A New Zealand Perspective on the Phase-Out of Sow Stalls'.*** *Journal of Agricultural & Environmental Ethics*, Vol 17, Issue 1.

Report

p. 179 Von Borell, E., Broom, D.M., Csermely, D., Dijkhuizen, A.A., Hylkema, S., Edwards, S.A., Jensen, P., Madec, F. and Stamataris, C. (1997). ***The Welfare of Intensively Kept Pigs.*** Report of the Scientific Veterinary Committee.

VISUAL AND ORAL TEXTS ON DVD

Behavioural Footage

- **Colony caged hens** (2015) (24 min 14 sec)
- **Crated sows** (2013) (22 min 56 sec)
- **Outdoor hen** (June 2015) (27 min 44 sec)
- **Outdoor pig** (June 2015) (27 min 30 sec)

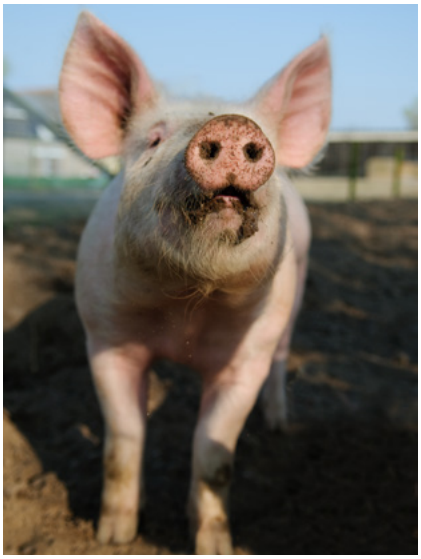
Activist Footage

- **Farmwatch.** ***'Farrowing Crates: A Life of Torment for Pigs'*** (4 min 31 sec) (September 2014).
- **SAFE Inc.** ***'Footage of an NZ Colony Cage System'*** (1 min 33 sec). Mainland Poultry, Waikouaiti (2012).

VISUAL AND ORAL TEXTS ONLINE

Current Affairs (Layer Hens)

- **Campbell Live.** ***Caged colony or free range eggs – do you know what you're buying?***, 7 August 2014, 15 min 40 sec, accessed 15 September 2016. www.3news.co.nz/tvshows/campbelllive/caged-colony-or-free-range-eggs--do-you-know-what-youre-buying-2014080719
- **Campbell Live.** ***Chickens, eggs, colony systems: What's the big secret?***, 25 July 2011, 7 min 32 sec, accessed 15 September 2016. www.3news.co.nz/tvshows/campbelllive/chickens-eggs-colony-systems-whats-the-big-secret-2011072520
- **Campbell Live.** ***Video reveals replacement for battery hen cages in NZ***, 19 March 2012, 9 min 3 sec, accessed 15 September 2016. www.3news.co.nz/tvshows/campbelllive/video-reveals-replacement-for-battery-hen-cages-in-nz-2012031916



OTHER RESOURCES (not in textbook)

SHORT WRITTEN TEXTS

Articles

- Grillo, Robert. ***'Chicken Behaviour: An Overview of Recent Science'.*** www.freefromharm.org/chicken-behavior-an-overview-of-recent-science/ *Retrieved 24 March 2015*
- McCormick Donaldson, Tammy. ***'Is Boredom Driving Pigs Crazy?'*** www.webpages.uidaho.edu/range556/appl_behave/projects/pigs_ster.html *Retrieved 25 March 2015*

Conference Paper

- Gaston, W., Armstrong, J.B., Arjo, W. and Stribling, H.L. (2008). ***'Home Range and Habitat Use of Feral Hogs (Sus scrofa) on Lowndes County WMA, Alabama'.*** *National Conference on Feral Hogs.* www.digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1003&context=feralhog

Journal

- Arshad, Muhammad Irshad and Zakaria, Mohamed (2011). ***'Variation in Home Range Size Exhibited by Red Junglefowl (Gallus gallus spadiceus) in Oil Palm Plantation Habitat, Malaysia'.*** *Pakistan Journal of Zoology, Vol 43(5)* www.djurensratt.se/sites/default/files/lund/science.pdf

Reports

- Humane Society Veterinary Medical Association (HSVMA). ***HSVMA Report on Gestation Crates*** (2013). www.hsvma.org/assets/pdfs/hsvma_veterinary_report_gestation_crates.pdf *Retrieved 20 March 2015*
- Broom, D.M. ***Statement of Witness Professor DM Broom – Sows in Farrowing Crates*** (2014). www.aussiepigs.com/documents/Pig%20slaughter%20video%20Broom.pdf

Websites

- Compassion in World Farming (CIWF) ***'Farm Animals'.*** www.ciwf.org.uk/farm-animals/ *Retrieved 26 August 2015*
- 'Research' ***'Species: Laying hens'.*** www.ciwf.org.uk/research/species-laying-hens/ *Retrieved 26 August 2015*
- 'Research' ***'Species: Pigs'.*** www.ciwf.org.uk/research/species-pigs/ *Retrieved 26 August 2015*
- United Poultry Concerns ***'Providing a good home for chickens'.*** www.upc-online.org/home.html *Retrieved 24 March 2015*

VISUAL AND ORAL TEXTS

Documentaries

- Real Stories BBC Scotland (July 2010). ***The Private Life of Chickens.*** (59 min 2 sec) www.youtube.com/watch?v=1c06xOF4uQ8 *Retrieved 27 March 2015*
- Real Stories BBC Scotland (May 2015). ***The Private Life of Pigs.*** (58 min 37 sec) www.youtube.com/watch?v=_ixJXruwWOY *Retrieved 2 February 2016*