

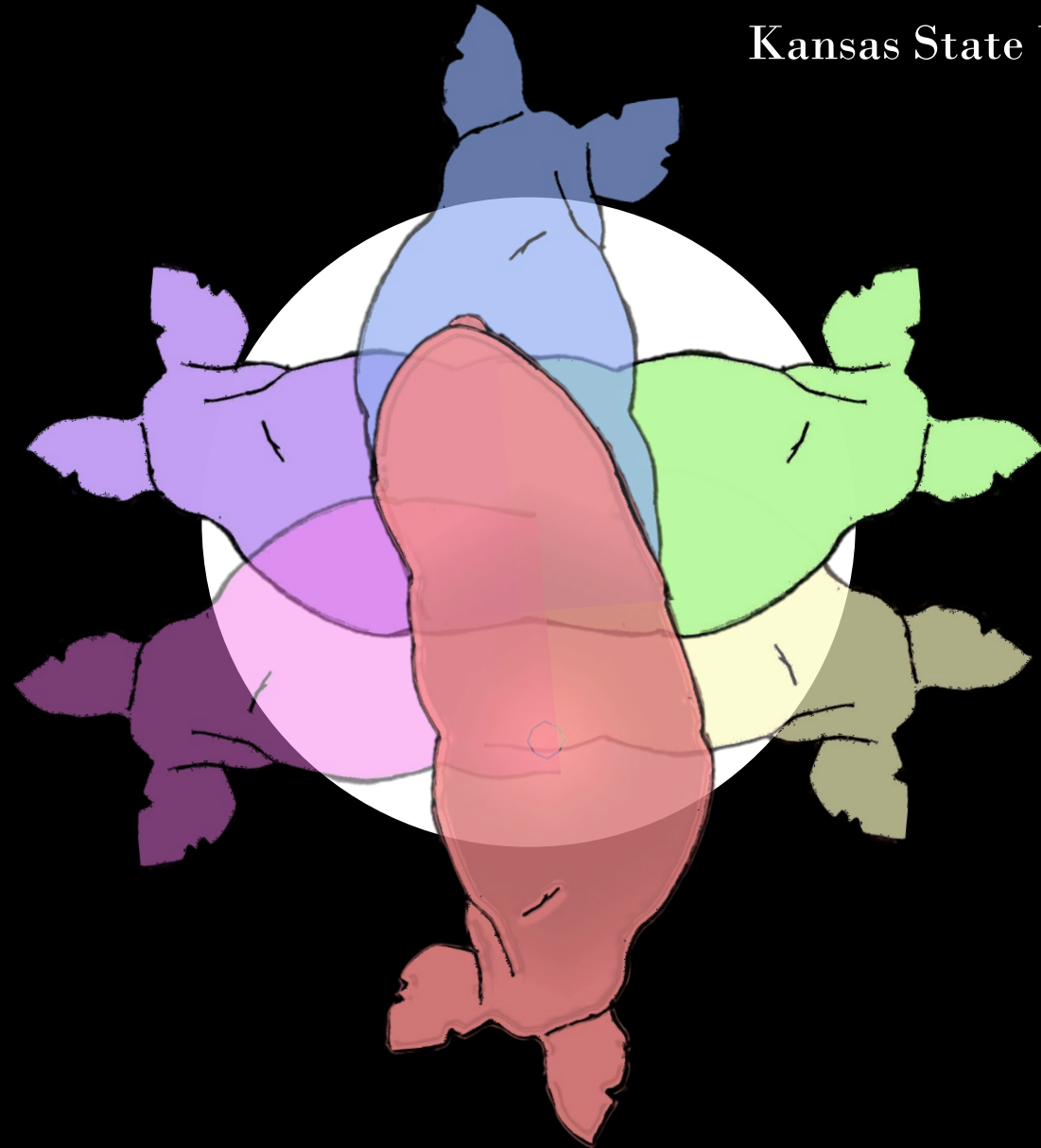
Lindsey E. Hulbert, PhD.

Animal Sciences and Industry

Kansas State University

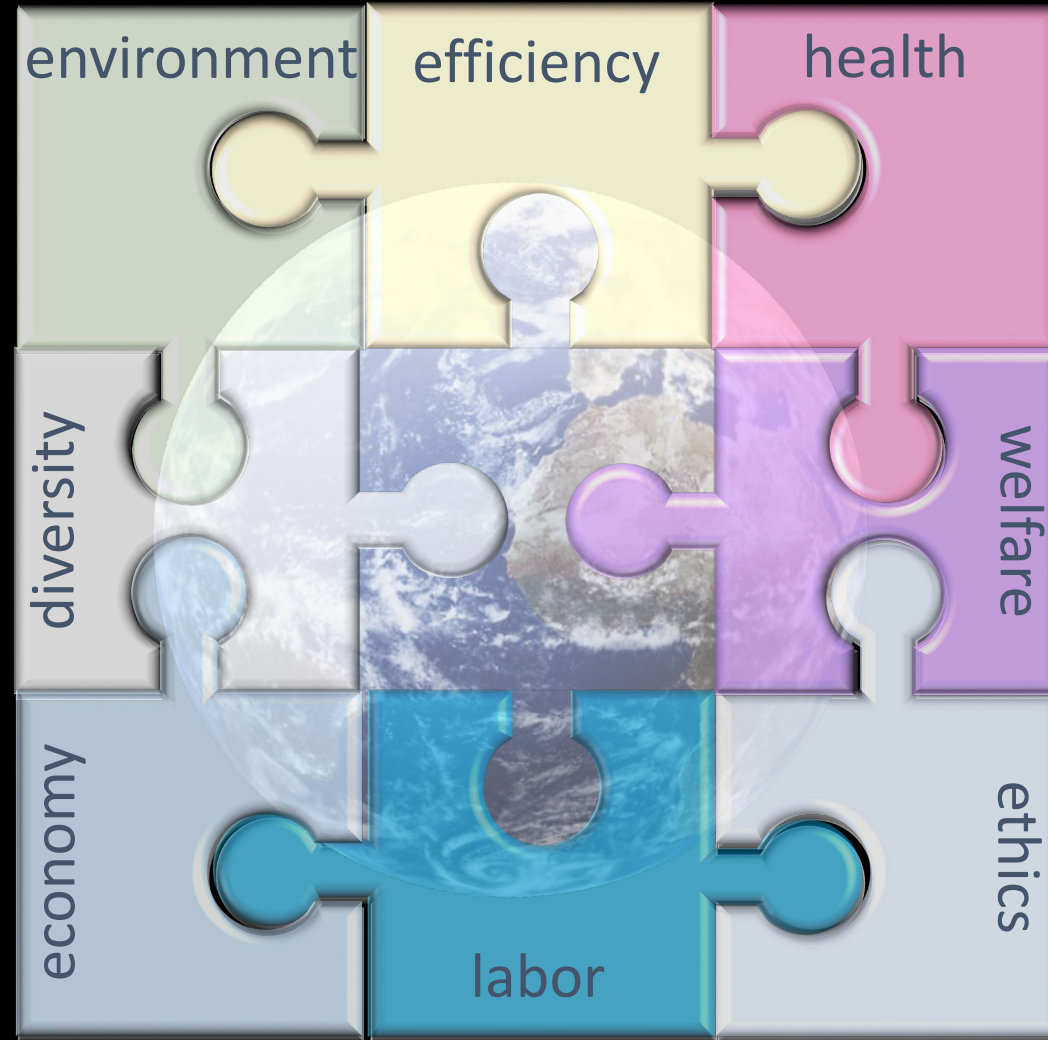
Precision Animal Welfare

*Lessons from Pig
Problems*



- Efficiency*
- Precision Livestock Farming
 - Precision Animal Management
 - Precision Management of Animals

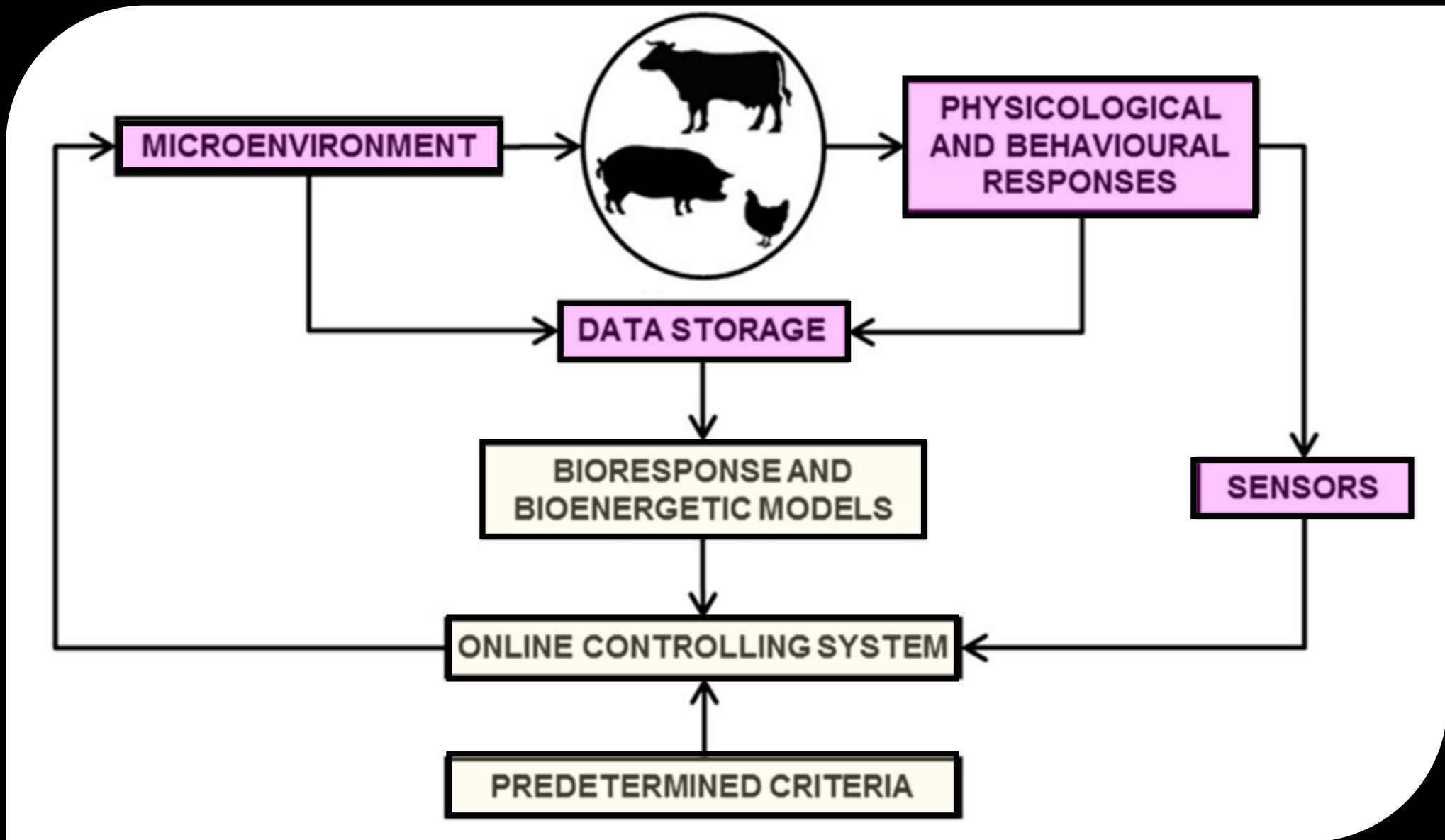
Sustainability of animal production



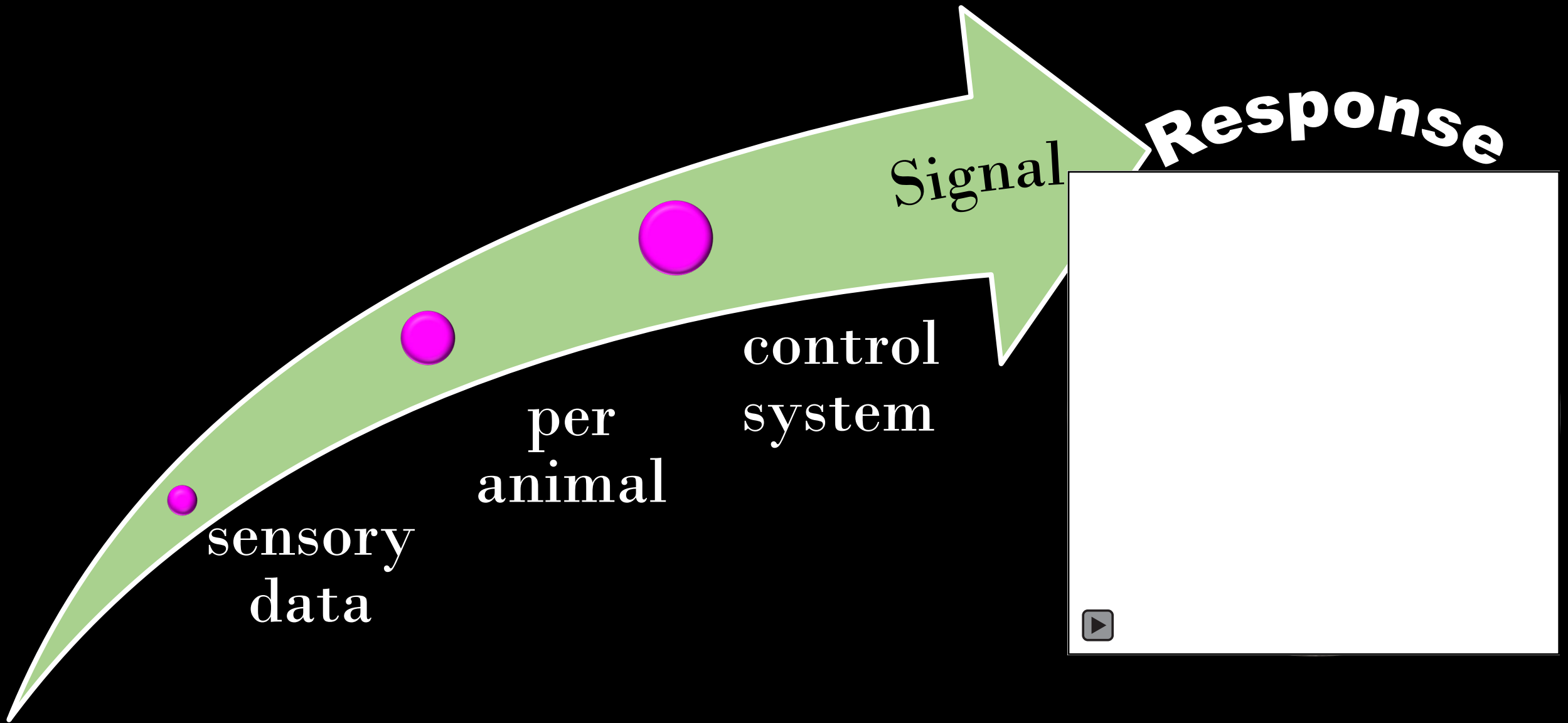
Precision Animal Welfare

Efficiency

- Precision Livestock Farming
- Precision Animal Management
- Precision Management of Animals

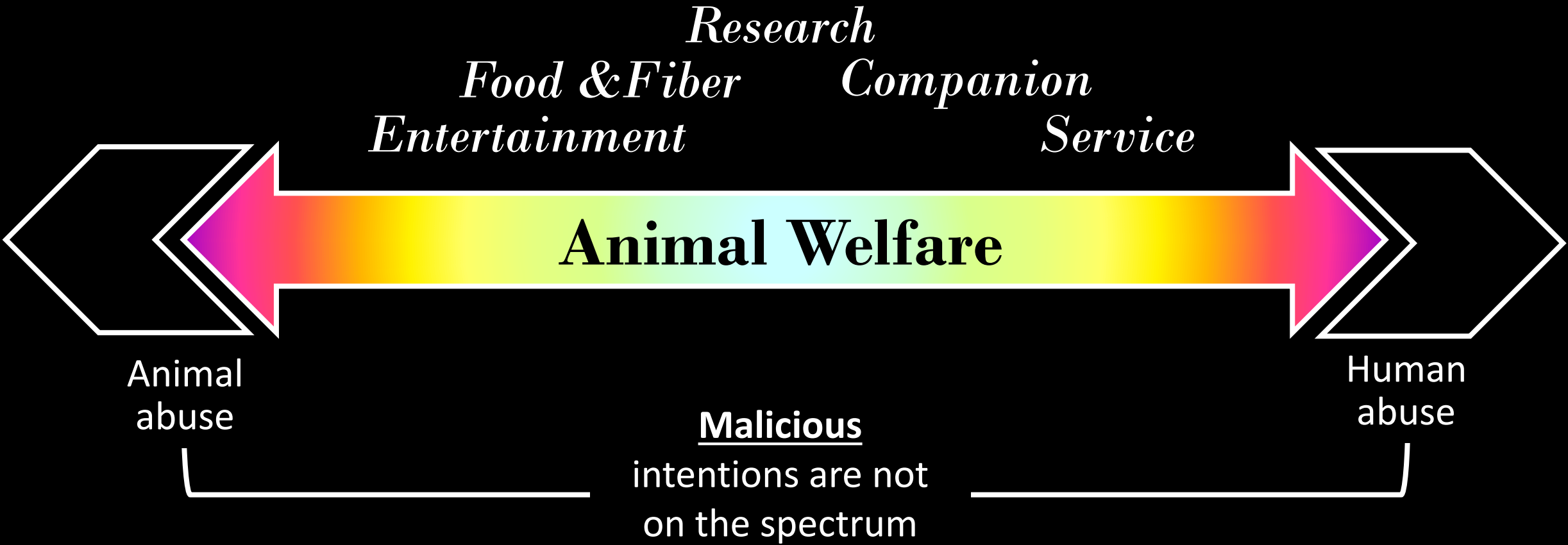


Fournal S. et al. 2017. Rethinking environment control strategy of confined animal housing systems through precision livestock farming. *Biosystems Engineering* 155: 96-23.



Wathes, C.M. et al. 2008; Berckmans et al., 2014; Borchers & Bewley. 2015; Halacmi & Guarino, 2016; Hertem et al, 2017.

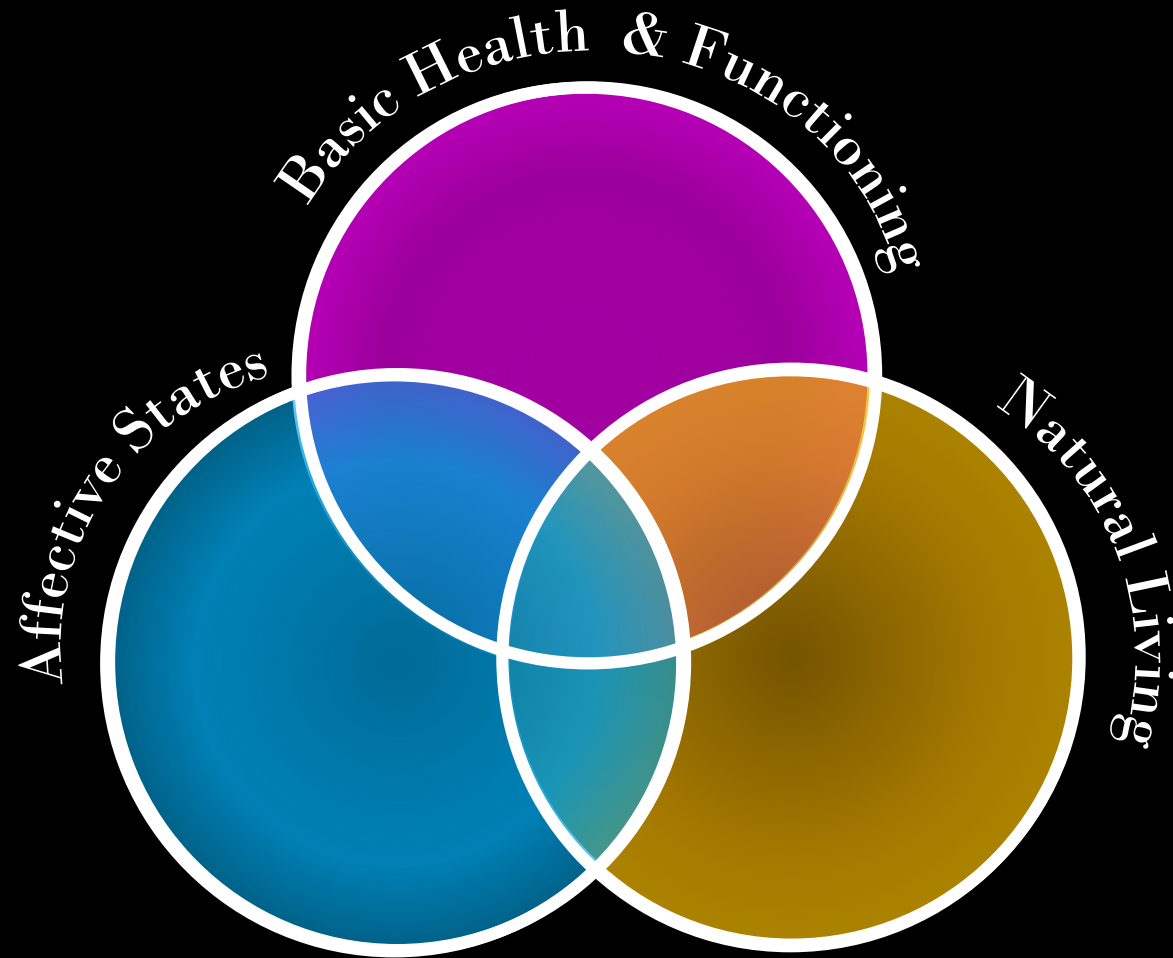
'Animal Welfare' evokes a spectrum of perspectives



Some animal rights perspectives include **Animal Welfare**



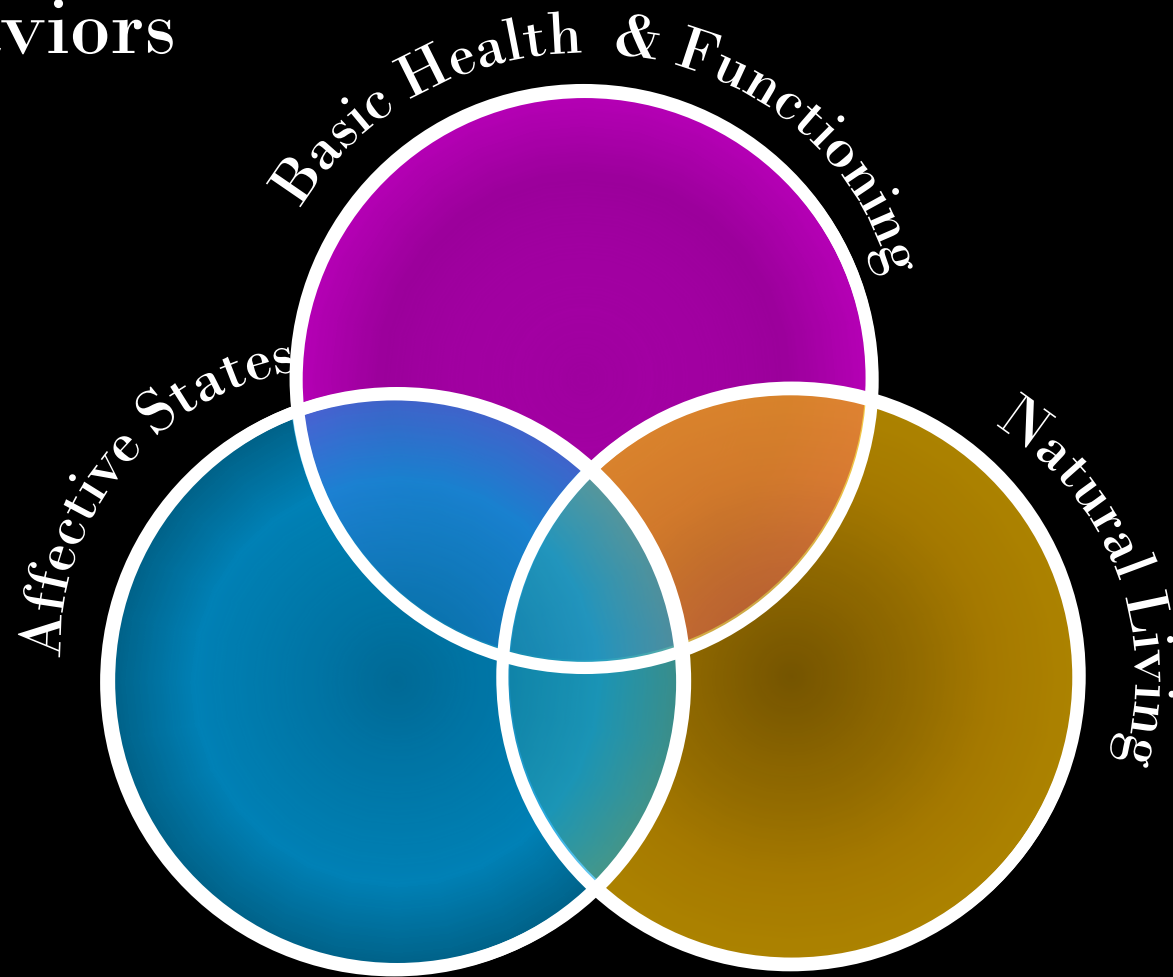
Animal Welfare Perspectives



“A good life”

Adapted from Figure 11.2 of Fraser, D. (2013). *Understanding Animal Welfare: The Science in its Cultural Context*. John Wiley & Sons.

Freedom to exhibit "natural behaviors" may include undesirable behaviors

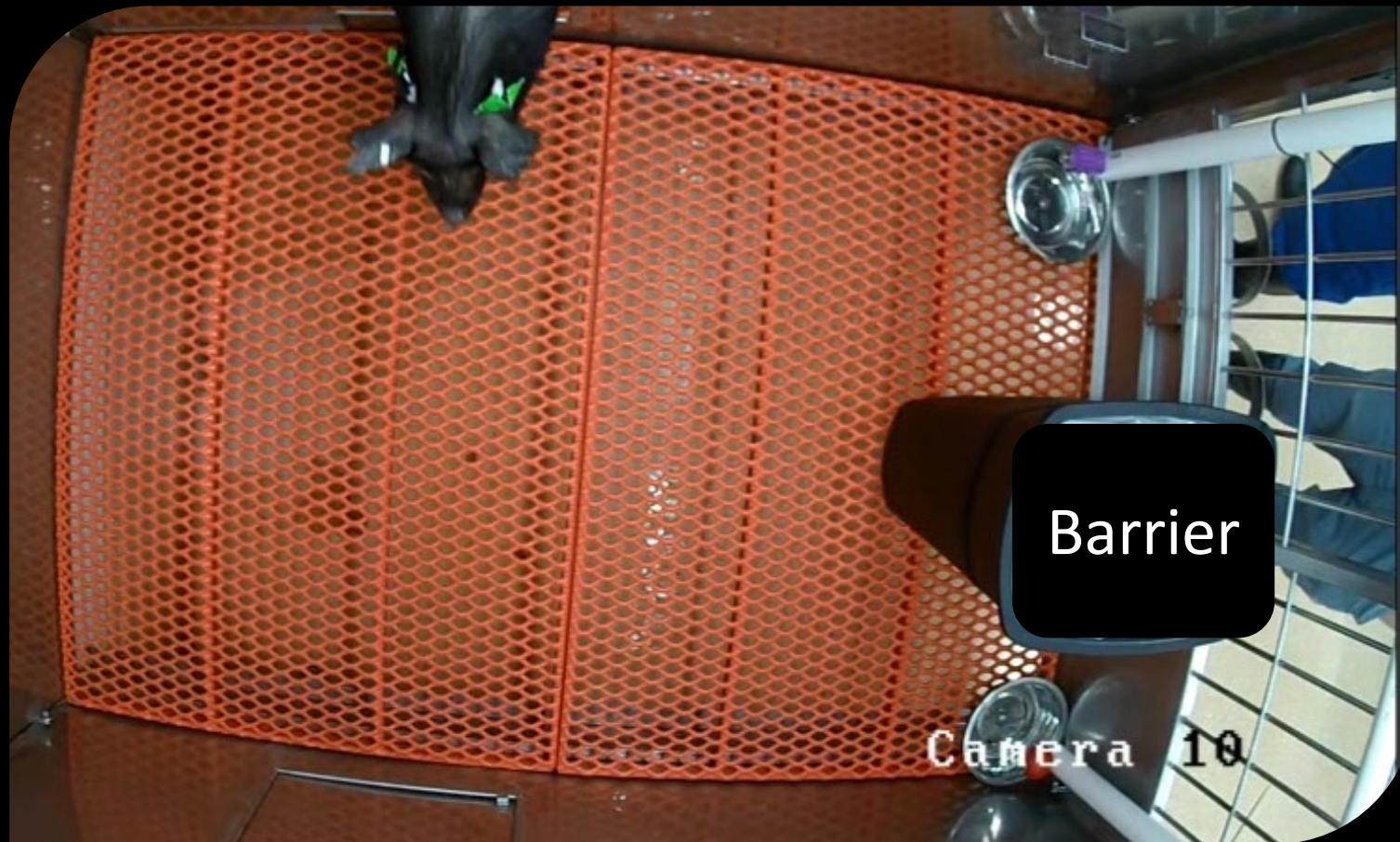


Sensors detect individual alarm calls during crushing, AI makes decision to stimulate sow to stand



Vibration stimulus requires classical and operant conditioning for pigs

Right buzz



Left toy

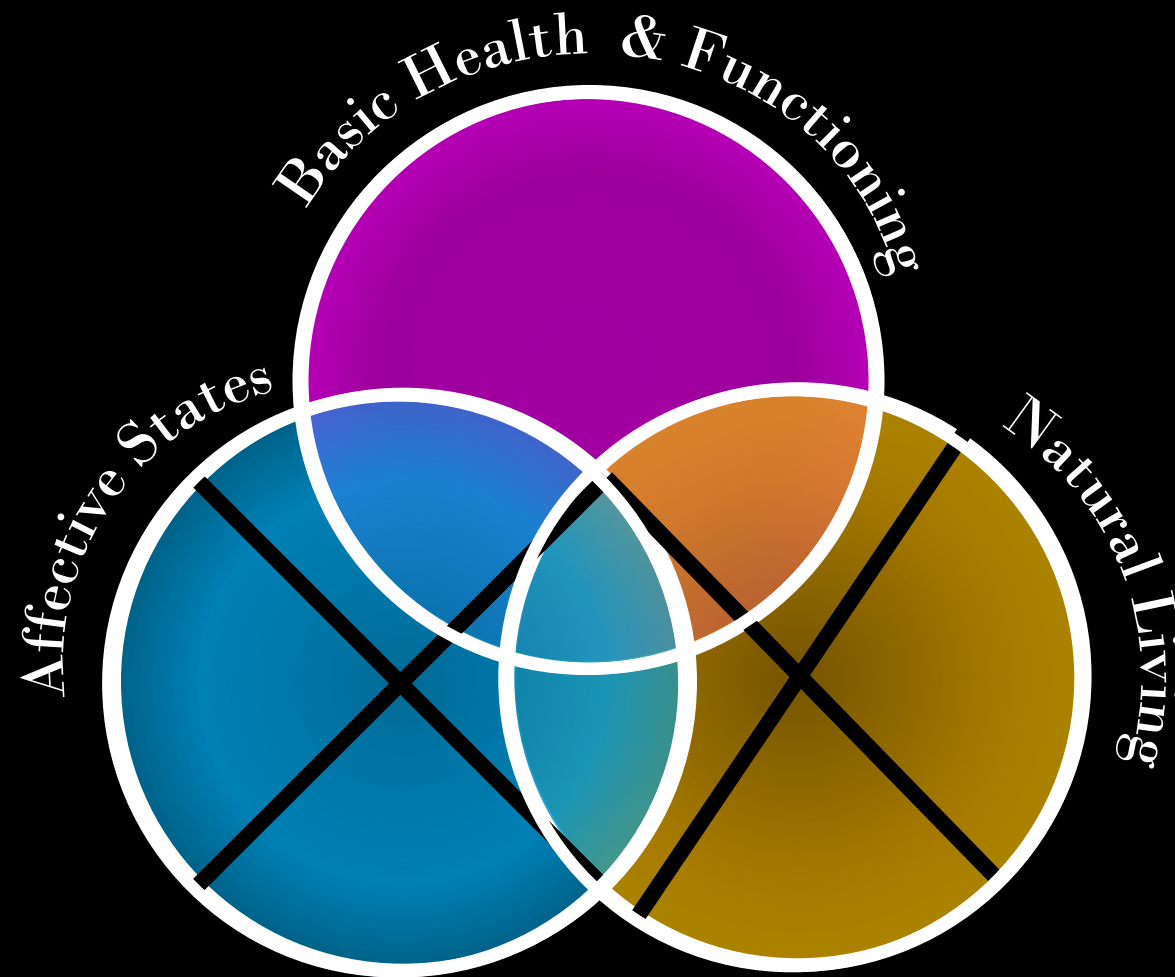
Right toy

Will the technology help get the sow out of farrowing stalls?



Mumm, J., E. Bortoluzzi, M. Coffin, L. Ruiz, M. Goering, D. Medin, M. Rooda, and L. Hulbert. 2018. Sow behavior, heart rate, and cortisol responses to a novel piglet crushing prevention technology to reduce pre-weaning mortality. *J. Anim. Sci.* 96 : 12-13.

Pig producers often don't adopt new technology because...



- User 'un-friendly'
- Biosecurity challenges

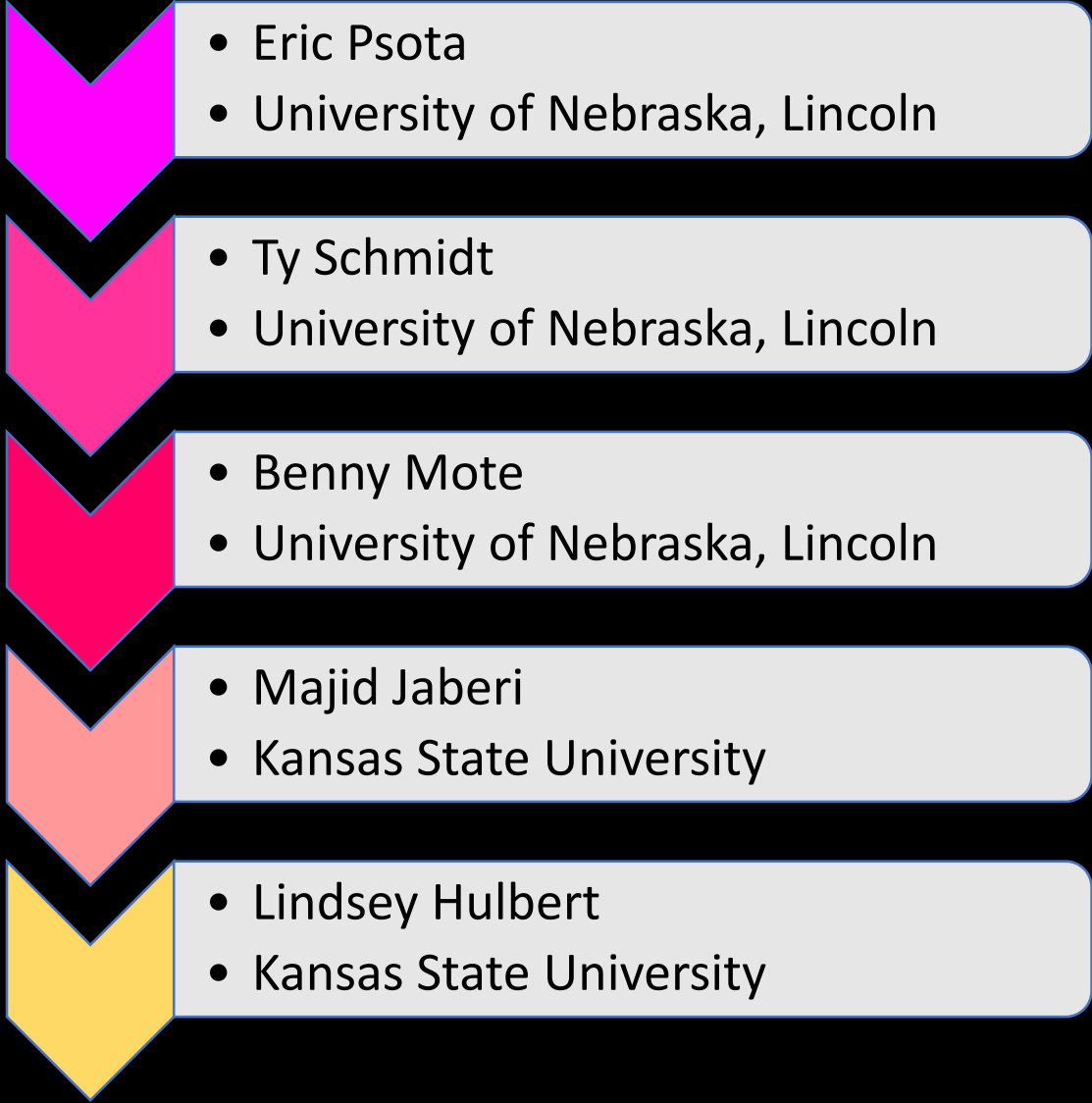


Precision Environmental Enrichment



Precision Visual Tracking of Pigs

NU *track*
Livestock Monitoring

- 
- Eric Psota
 - University of Nebraska, Lincoln

- Ty Schmidt
- University of Nebraska, Lincoln

- Benny Mote
- University of Nebraska, Lincoln

- Majid Jaber
- Kansas State University

- Lindsey Hulbert
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06-02-2018 07:30:43 PM
 Working with Data: Active State



Tag ID	B1	B22	B333	G1	G22	G333	R1	R22	R333	W1	W22	W333	Y1	Y22	Y333	O1	O22	O333	P1	P333
Dist(m)	5	3	0	5	4	5	3	3	6	4	14	8	3	2	0	4	8	4	10	11
Ang(rad)	7	8	1	7	8	9	5	6	14	6	35	11	13	5	0	12	17	8	15	32
Lie(s)	19	0	24	0	0	4	10	2	0	0	0	0	0	0	40	0	0	0	0	0
Stand(s)	23	42	18	42	42	38	32	41	42	42	42	42	42	42	2	42	42	42	42	42
Perch(s)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Eat(s)	2	42	0	0	32	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0
Drink(s)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Position																				

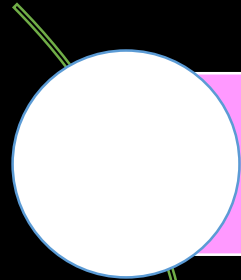


0:21 / 13:50

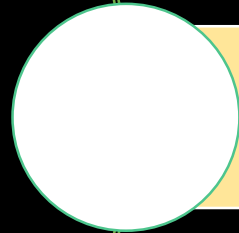


Visual Tracking Technology

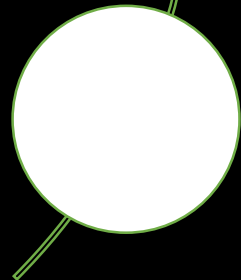
NU *track*
Livestock Monitoring



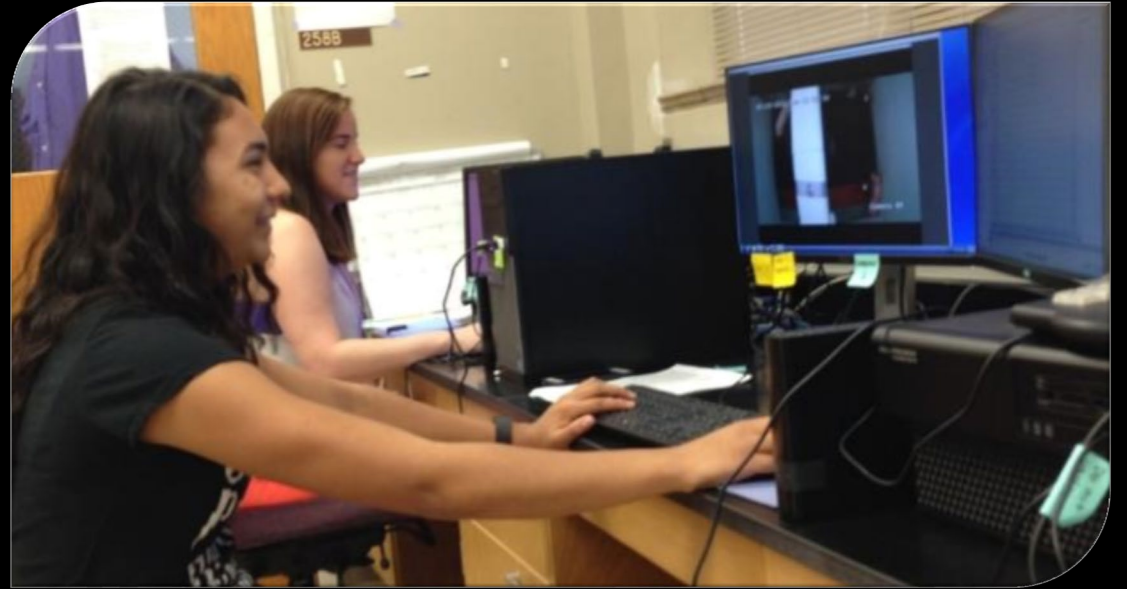
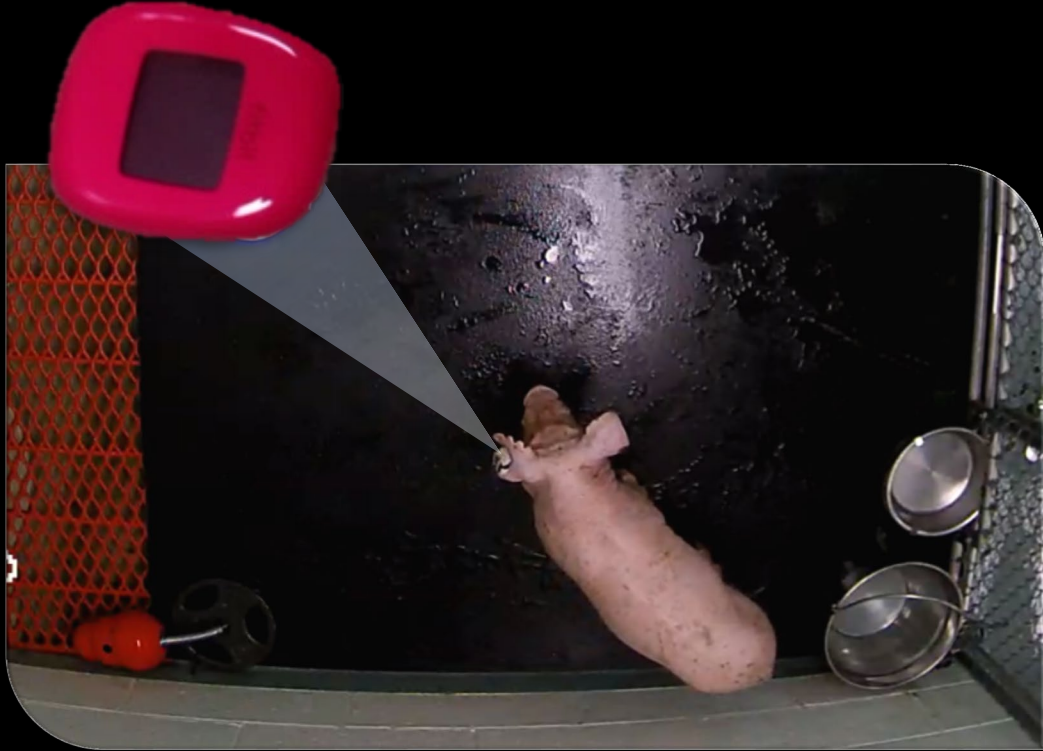
Minimally invasive



A “problem” can be detected by a machine and then reviewed by a human



Wearable Technology



Hernandez, et al. 2017 Luo, Y., 2017

Visual Tracking Technology

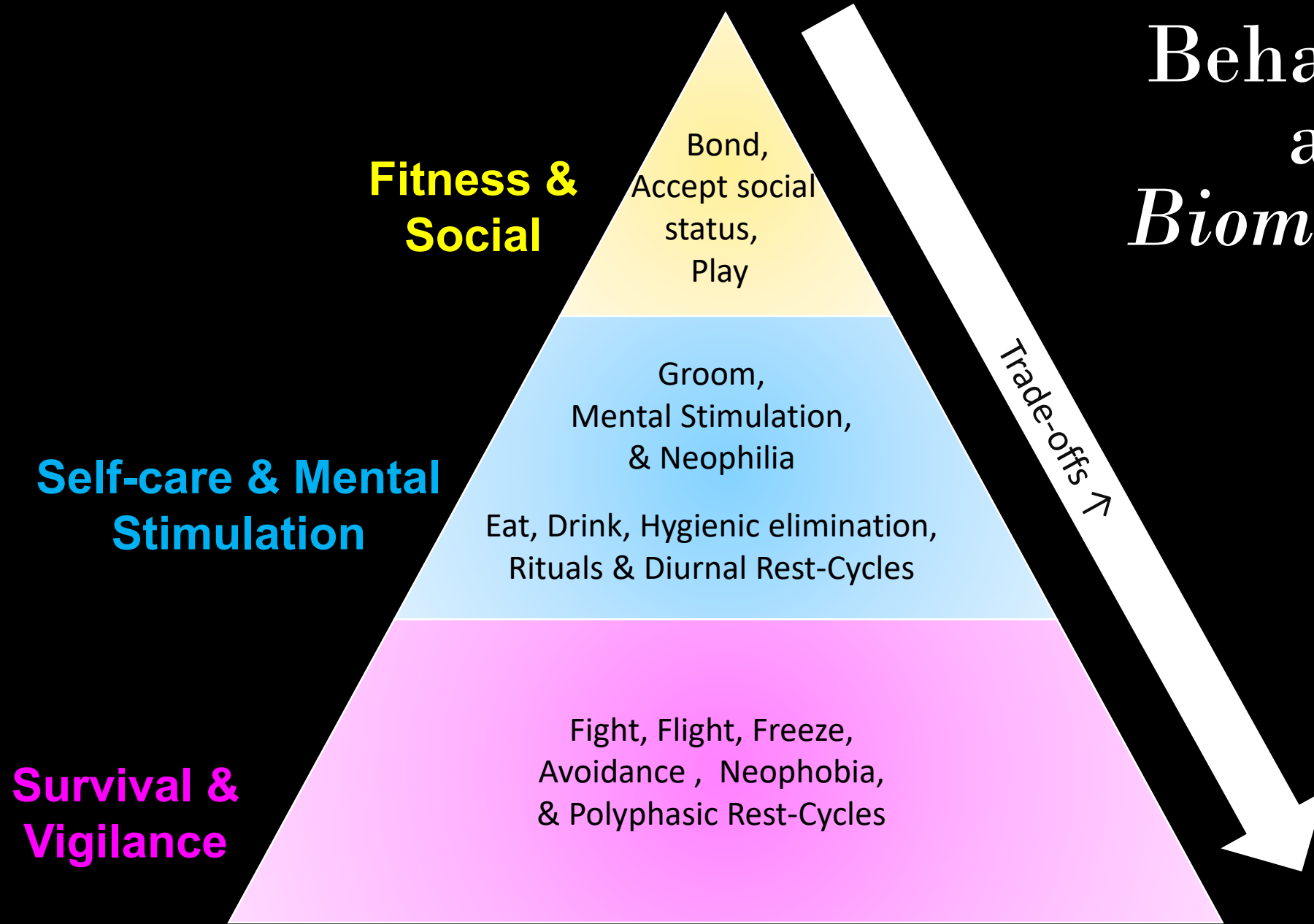
NU *track*
Livestock Monitoring

Minimally invasive

A “problem” can be detected by a machine
and then reviewed by a human

Knowledge base of behavioral repertoire

Behaviors as *Biomarkers*



Thank-You!



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