

Insights Into Animal Behavior and Autism, 2nd Edition

Temple Grandin, Professor



**Colorado
State**
University

1

Animals Live in a Sensory Based World

- Get away from verbal language to understand animals
- What is the animal seeing, hearing, smelling, and touching?

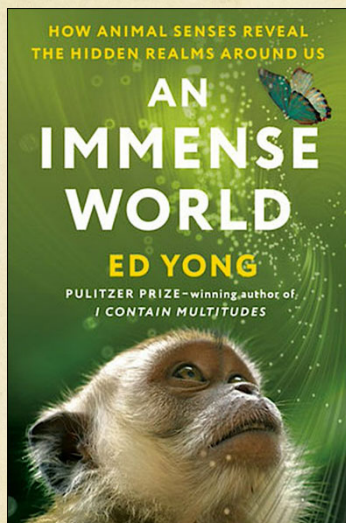
2

Dog's Nose – Direct Wiring to Visual Cortex



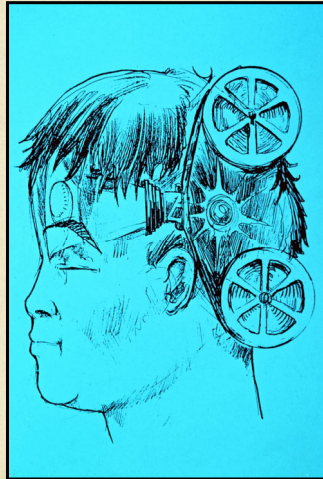
Andrews et al., 2022
Cornell University

3



It is a mistake
to yank a dog
away from a
tree it is
smelling.

4



I see movies in my
imagination and
this helped me
understand animals

Little Rainman by Karen Simmons

5

-
- When I was young, I thought everybody thought in pictures
 - Learning that I thought differently provided great insight
-

6

**New Things Are *Attractive* When the
Animal is Allowed to Approach
Voluntarily and *Frightening* When
Suddenly Introduced**



7

Sudden new things and
experiences are
frightening to both
animals and people
with autism

8

Many Problems With:

- Many dogs lead too sheltered a life and are afraid of new things
- Edwards et al. (2019) Dogs that fear their veterinarian are also afraid of any new situation

9

Objects
may be
perceived
as new
when
rotated



Original Position



Rotated Position

Corgan, et al., 2021

10

These objects are totally different pictures



Learning that the umbrella is safe
does not transfer to the tarp

11



- ✓ Sharp shadows – Cattle more likely to stop moving
- ✓ Outdoors – Shadows constantly change

Willson et al., 2021

12



13

Cattle Fear the Spider Monster



14



Cattle may refuse to move when they see the white jug and the red car

15



Tie up loose chain ends that scare animals

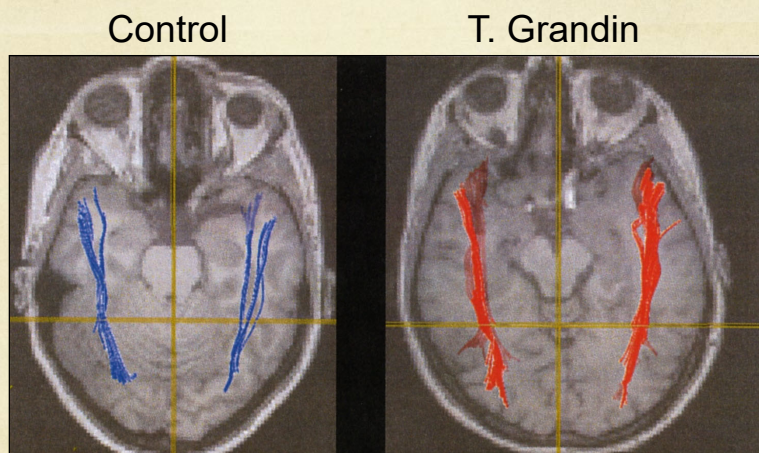
16

Lack of Outer Solid Side Cattle See Truck Loading



17

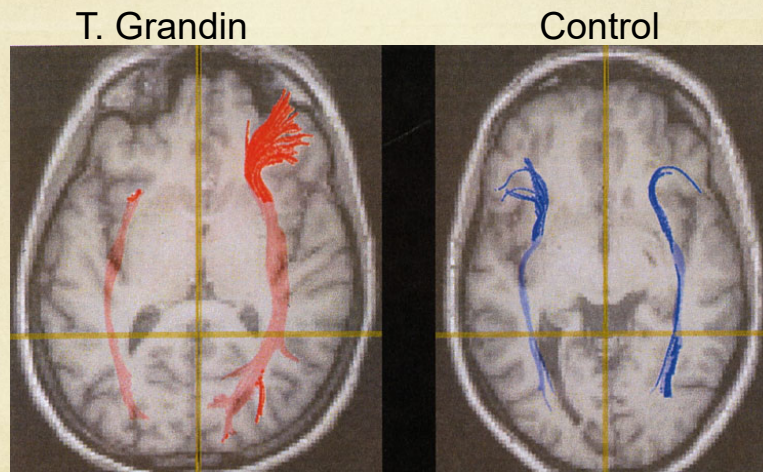
Brain Scans of Large Visual Thinking Circuit



Humphreys, Minshew, Behrmann, and Cibu, 2006

18

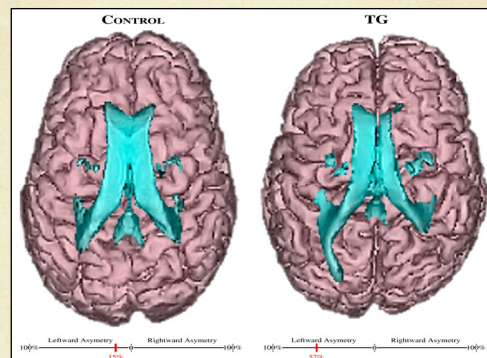
Brain Scans



Humphreys, Minshew, Behrmann, and Cibu, 2006

19

Abnormalities in Left Hemisphere



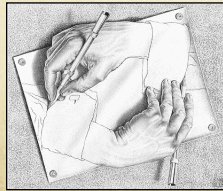
Working Memory and Algebra
Department Failed to Develop

University of Utah, 2010

20

Develop Talents in the Individual's Specialist Brain

1. Photo Realistic Visual Thinking – Object Visualizer - Poor at algebra
2. Pattern Thinker Music and Math – Visual Spatial - Poor in reading
3. Verbal Thinker has thoughts in words – Poor at drawing
4. Auditory Thinker – Learns better with hearing words



There can be mixtures of these thinking types

21

This horse is afraid of black cowboy hats because he was abused by a person wearing a black hat



**White hats
cause no
reaction**

**Animal
fears are very
specific**

22

Calm Animals Easier to Handle 20 to 30 Minutes to Calm Down



Photo by Sherry Taylor

23

-
- ✓ The importance of reducing fear is now being recognized
 - ✓ Fear free methods are being used at veterinary clinics
 - ✓ Fear of the Veterinarian is a common problem
-

24

Fear Free Nail Trim With a Lion



25

**Fear is a Strong Stressor
Young Dogs Fearful of Loud Noise
and Unfamiliar People or Animals
Turn Gray at an Early Age**



Camille King et al., 2016

26

**Fear is the Main
Emotion in Autism
My Amygdala (Fear
Center) is Three
Times Larger**

University of Utah, 2010

27

**Low Fear Dogs
Lower Stress**

-
- ✓ Bold personality makes domestic dogs entering a shelter less vulnerable to disease
 - ✓ Shy dogs (high fear) poorer immune parameters
-

Corsetti et al., 2018

28

Animals Have Emotions



- Prozac works on dogs. Increases serotonin at nerve endings
- Brain systems where emotions originate are located in subcortical brain areas that are similar in all mammals
- Neurotransmitters same

29

Genetics of Horse Domestication

- ❑ Two small genetic changes associated with greater use of horse
- ❑ Increase in serotonin neurons
- ❑ Decrease in back pain
- ❑ Chariot invented



Librado et al., 2021

30

Core Emotions

- ❑ **FEAR** – Most primitive emotion for survival (Amygdala) (Shy or bold personality)
- ❑ **RAGE** – Anger (Hypothalamus)
- ❑ **PANIC** – Separation anxiety (Periaqueductal area brain stem) (Isolation stress)
- ❑ **SEEKING** – Approach novelty (Nucleus Accumbens) (High or low exploration personality)
- ❑ **ADDITIONAL EMOTIONS** – Lust, caring, play

Jaak Panksepp, Affective Neuroscience, 1998 and Panksepp, 2011

31

Music Mixing – Board of Emotion

- ✓ High or low FEAR (Shy or bold) cows, separate trait from aggression
- ✓ High or low SEEK (Exploration) Go getter, Laid back cows

Perez-Torres et al., 2014;
Goodman et al., 2016

32

A Non-Slip Floor is Essential as Slipping Causes Fear

Reward
puppies
with treats
to tolerate
having their
paws held



Credit: Brandon's Life Blog

33

Research by Dr. Gregory Berns, Emory University

Reward circuits in dog's brain are activated similar
to humans when they smell familiar people or see
hand signals associated with food



Credit: Wired Magazine, wired.com

34

Chickens and Rats Self Medicate with Pain Killers

- Artificially create an arthritic joint
- Provide two feeders or water bowls
 - One contains a bitter tasting pain killer and the other contains plain feed or water
- Animals choose the pain killer when the joint is inflamed and switch away from it as the joint heals

Colpaert et al., 2001

35

A 45-minute daily play and training period reduces cortisol levels in shelter dogs housed individually in a noisy kennel



Contact	26 mg/ml
No Contact	41 mg/ml

Coppola et al., 2006

36

Dog Park That Works



- Attentive staff
- No outside food or toys to prevent resource guarding
- Really aggressive dogs not allowed

37

Pressure Wrap Effects Reduces Separation Distress

- Reduced heart rate
- More effective on dogs not on medication
- Dogs spent less time orienting towards the door of the kennel

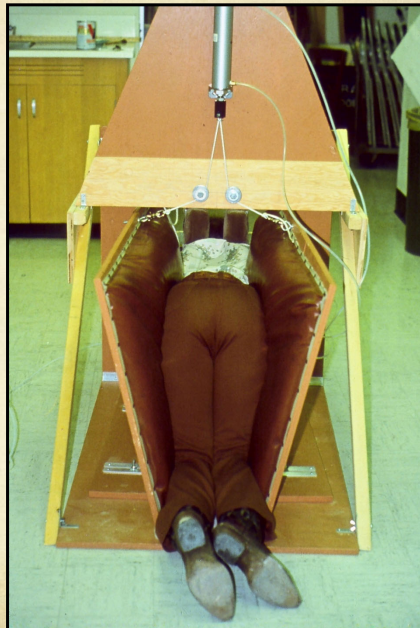
King et al., 2014

38



The squeeze machine helped reduce anxiety and panic attacks

39



40

Brain Can Be Either More Cognitive Thinking or More Social Emotional

- Solitary mammals provide an animal model for autism
- Dog sociability and friendliness genetically related to Williams Syndrome

Reser et al., 2014;
Von Holdt et al., 2017

41

Compared to wolves, dogs will look to people to help them solve a difficult problem. This behavior is heritable (Persson, et al., 2015)

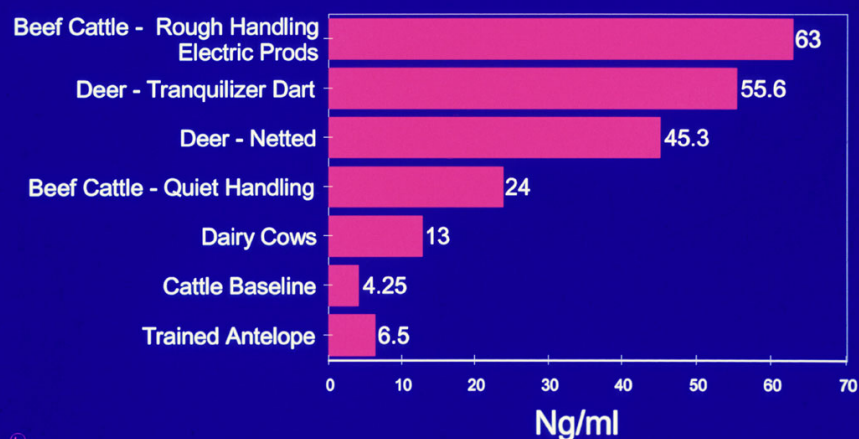
42

The Same Gene Sequences That Give Humans a Large Brain, May Also Cause Autism, Schizophrenia, and Epilepsy

Sikela and Searles, 2018

43

Cortisol Levels During Restraint



44

Voluntary Cooperation Greatly Lowers or Eliminates Fear Stress



Grandin et al., 1998



45

Good Stockmanship is Important

- Pigs easier to move and lower heart rate when acclimated to walking in alleys (Lewis et al., 2008; Geverlink et al., 1998)
- Acclimating heifers to moving through chutes lowered cortisol and improved reproductive performance (Cook et al., 2012)

46

An animal's first experience with a new person, place, or vehicle should be good to prevent the formation of fear memories



Credit: Miss Behavior's Blog

47

Horses will show less fearful behavior when confronted with a novel object when they were with a familiar person. Heart rate stays the same

(Marshall and Christensen, 2015)

Owner present during veterinary exam lowers heart rate and less fear behaviors

(Stellato et al., 2020)

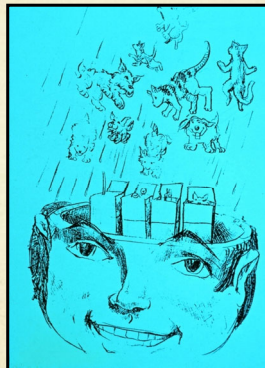
48

On the leash and off the leash – two different categories



49

Sensory thinkers sort specific pictures, sounds, touches, and smells into categories



Little Rainman by Karen Simmons

50

- All my thinking uses specific examples to create concepts
- It is **bottom up thinking** and not **top down thinking**
- I learned ALL concepts using specific examples put into categories

51

Bottom Up Thinking

- Animals
 - People with Autism
 - Computer Artificial Intelligence
-

52

The Flight Zone is the Animal's Safety Zone

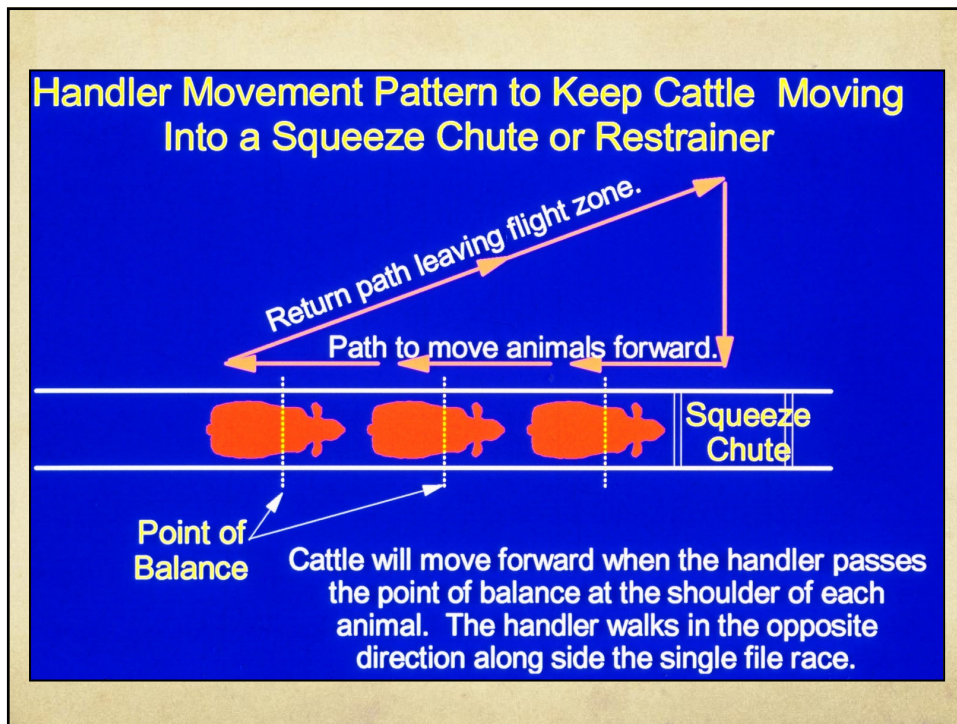


53



**Animals turn away when the
handler enters the flight zone**

54



55

Sell Yourself with a Portfolio

- ✓ Put it on
your phone
- ✓ 30 second
WOW

LIVESTOCK HANDLING SYSTEMS

A Well Designed Facility will help make your
Livestock Operation More Profitable.



CUSTOM DESIGNED
To Fit Your Operation:

Working, sorting, loading and hospital facility at A. Gurnee Ranch, Fremont, NE. The system has a curved feed loading chute, hospital pen, sorting pen, scale, curved hospital pen, working chute and horse pen. Curved chutes and smooth cattle flow reduce stress and improve efficiency. The curved working circle is designed for easy walkouts. Employees will do their job of processing in close facilities which prevent them from the weather. Cattle stress prevention will improve cattle performance.

CURVED WORKING CHUTES
For Greater Efficiency:

A curved single file chute, round working pen and scale curved alley reduce sorting and reduce stress at Alan Voth's new calf operation in Saskatchewan, Canada. A handler working from the outside along the inner radius can move cattle easily into the round round pen and separate. Cattle can be sorted 3 ways after the separate chute. Grandin designs handling facilities for all types of ranch and feeder operations.



Consultant & Designer of livestock handling facilities for feed lots, ranches, packing plants & auctions.

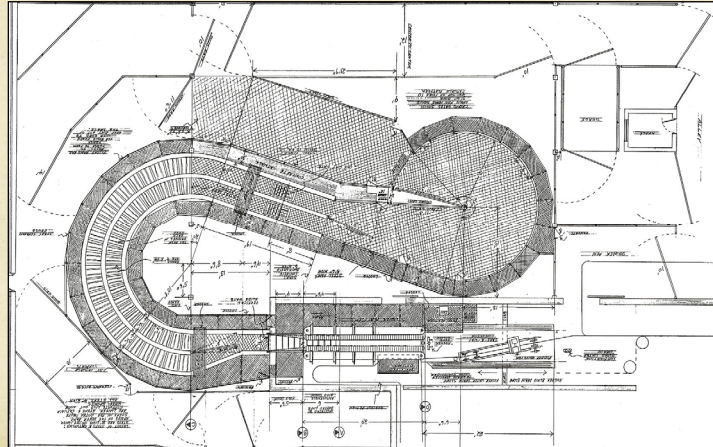
GRANDIN LIVESTOCK HANDLING SYSTEMS, INC.

Sales: 714.887.8800
Urbana, IL 61801-797-8800-4815

2018 Silver Plaque Dr. # C-3
Fort Collins, CO 80526

56

People Were Impressed With My Drawings



57

Cattle move easily through the wide curved lane to the crowd pen



58

Non-Slip Flooring is Essential

- Animals get agitated when they slip
- Squeeze chutes, stocks, scales, unloading ramps



Steer coming out of squeeze chute

59

-
- Measuring Livestock Handling Prevents Bad From Becoming Normal
 - People Want the Thing More than the Management
-

60

Survey of Cattle Handling in Squeeze Chute in 28 Nebraska, Kansas, and Colorado Feedlots

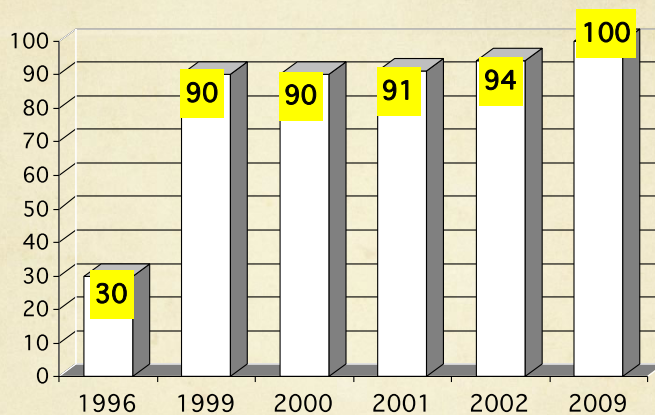
	Average	Range
Electric Prod %	5.5	0 to 45
Vocalization % *	1.3	0 to 6
Exit Falling %	0.8	0 to 2
Exit Stumble %	6.7	0 to 28
Miscaught %	2.2	0 to 16
Exit Run %	30.7	2 to 75

* No branding, castration, or dehorning

R. Woiwode, 2014

61

Percentage of Beef Plants That Stunned 95% or More Cattle with the First Shot



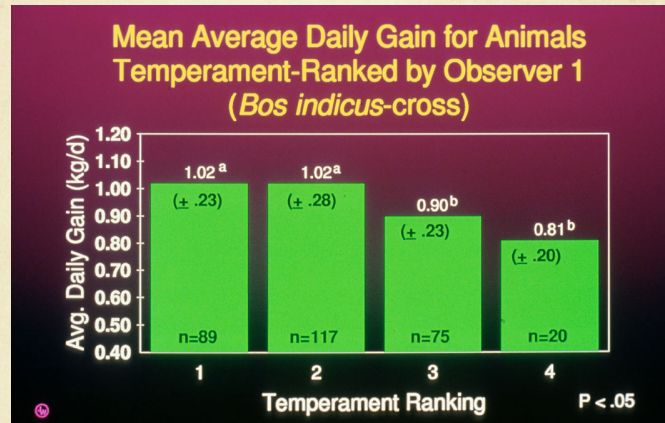
USDA survey prior to industry wide auditing

McDonald's Audits started

Continued auditing by major customers
Continuous auditing maintains good performance

62

Cattle that become agitated in the squeeze chute have lower weight gains



Cattle that run fast out of the squeeze chute may perform poorly

Voisinet et al., 1997, Fell et al., 1999

63

- Do not over select for temperament
- Genetic differences in maternal behavior
- Difference in vigilance
- Some mothers call their calf
- A few poor mothers walk away

Florecke et al., 2012

64

Purebred Brahman Approach People for Stroking



65

Critical Control Points for Cattle Welfare

- ✓ Handling scoring
- ✓ Sores, lesions, damaged knee joints, swollen leg joints
- ✓ Lameness and mobility
- ✓ Dirty animals
- ✓ Body condition
- ✓ Ammonia levels – Indoor animals
- ✓ Heat stress – Open mouth breathing in cattle
- ✓ Coat condition

66

Example: Lameness is an Outcome of Many Bad Conditions

- ❖ Agitated Cattle Scuff Hooves (toe abscesses)
- ❖ Rapid Growth
- ❖ Poor Leg Conformation
- ❖ Poor Foot Care
- ❖ Foot Disease
- ❖ Injuries
- ❖ Beta-Agonists – Hot Weather

67

Poor Leg Conformation Causes Lameness and Difficulty Walking



Correct

Collapsed Poor
Poor

Straight Post

68

Post Legged Cattle Leg is Too Straight



69

The pig has bad leg conformation



Beef should not repeat this mistake

70

Corkscrew foot – A genetic defect in cattle



**Photo by L.A. Horstman, DVM,
Purdue University, 2010**

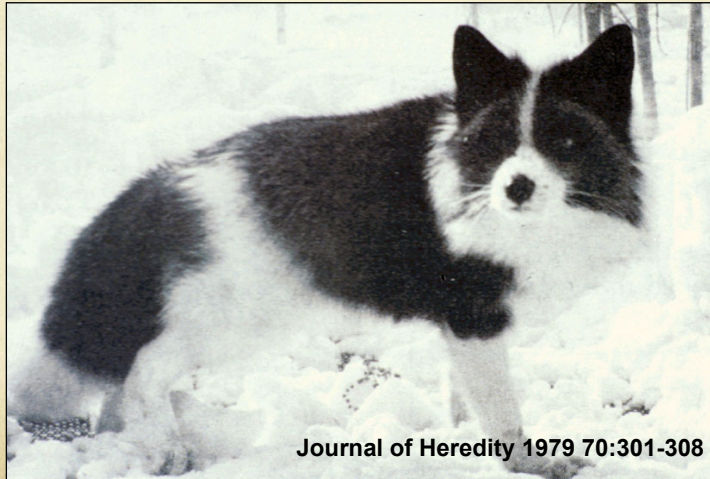
71

**A wild fox
is fine
boned
slender
and
nervous**



72

The Russian scientist, Belyaev, selected foxes for a calm temperament and found that other traits, such as coat color also changed



73

Domestication of deer started thirty years ago. They would not have tolerated a person in the small pen.



74

Older Type Bull Dog



75

Modern Bulldog



76



Photo Credit: *New York Times*, 1938

77

A Good Pug That Can Breath



78

Extreme Arab Horse



Has selective breeding of horses gone too far?

Horsesmacl.com, Andrea Marques

79

Need to Look at Quality of Life When Assessing Welfare

-
- Preventing suffering is not sufficient
 - Does the animal have positive emotions
-

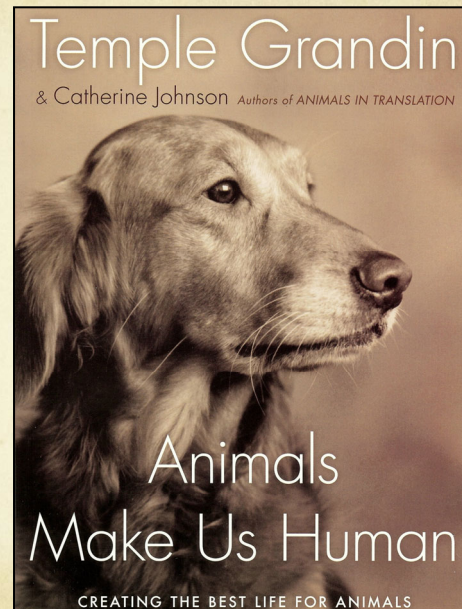
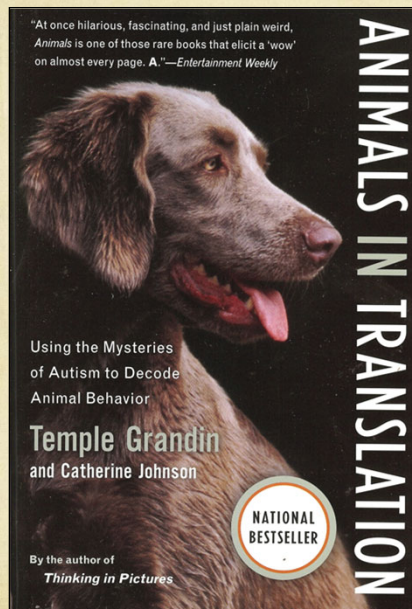
80

Does an Animal Have a Life Worth Living?

- ✓ Heavy broiler will ride swinging platform
- ✓ Requires really good management

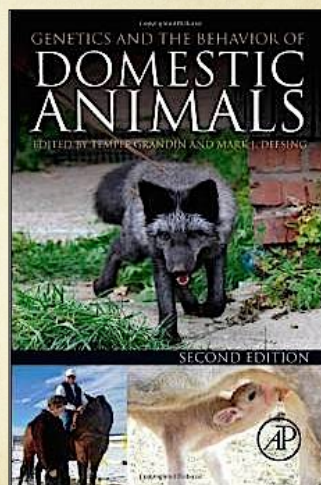
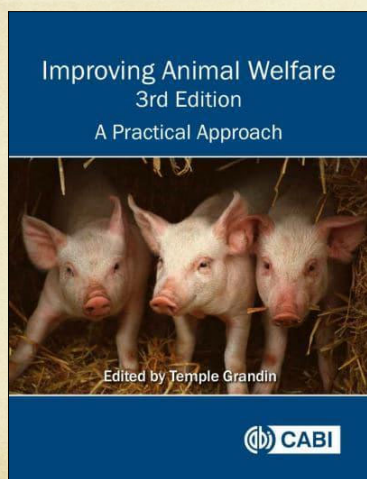


81



82

www.grandin.com



83