MOUSE FACT SHEET

I. Mice as laboratory animals

Mice, mus musculus, are the most widely used vertebrate animal in biomedical research with approximately 10.5 million used annually in the United States alone. They are quiet, burrowing rodents, and prolific breeders lending themselves to great genetic diversity through selective breeding and inbreeding schemes resulting in a vast array of mutant strains and human disease models too numerous to list.

Some unique characteristics of the mouse include:

- three pairs of thoracic and two pairs of inguinal mammary glands reaching from ventral midline over the flanks, thorax and portions of the neck exist in both males and females

- may live in compatible male dominated hierarchies but overall social organization is either loose or poorly defined with fighting among males a common occurrence

- ovulation occurs at midpoint of darkness period during day/night light cycle

- female mice housed together may enter a period of continuous anestrus terminated by the presence or odor of a male resulting in the females coming into heat in approximately 72hrs. (the Whitten Effect)

- if bred within the previous 24hrs., and exposed to a strange male, the female may abort the pregnancy (the Bruce Effect)

- shipping stress may cause depression of the immune system and therefore mice should be allowed a stabilization period of at least 48hrs.

- are not true endotherms as the newborn is ectothermic with temperature control not fully developed until day 20

- excrete more protein in their urine than any other mammal

II. Common diseases and conditions

A. Sendai virus

Sendai is a naturally occurring respiratory virus that is highly infectious and easily disseminated. Suckling and weanling mice are the most seriously affected with some inbred strains (e.g. DBA/2, 129) being more susceptible than others. Two patterns exist in colonies, an endemic, self perpetuating clinically silent infection and an acute infection which nay be clinically overt that either disappears or becomes endemic. The impact of this viral infection on research can be devastating. It depresses the mouse's cell-mediated immune system and decreases intrapulmonary antibacterial activity to name just two areas of importance. Purchasing mice from Sendai-free colonies, routine serologic colony surveillance, and strict separation of potentially contaminated animals are essential preventive measures.

B. Mouse Hepatitis Virus (MHV)

MHV is a ubiquitous, highly contagious corona virus which can induce a wide array of diseases in varyingly susceptible strains of mice. Like Sendai virus, MHV can have a profound affect on research results because of its ability to alter lymphocyte differentiation, phagocytosis, tumor growth, antibody response, hepatic enzyme activity and more. It can be particularly devastating in nude mice where a wasting syndrome develops. It should be possible to eliminate MHV by strict quarantine or cessation of breeding without introduction of new animals but because of the rather long period of viral shedding stringent quarantine procedures must be followed. It is also important to be aware that there are many strains of MHV and that infection with one strain does not result in immunity to other strains. Transplantable tumors and other "passaged" biologicals may be contaminated and must be tested for viruses.

C. Barbering

This condition of over grooming is common among adult mice. Animals appear to be shaven especially around the muzzle but other areas can be affected as well. Typically one individual in the cage is normal looking, he or she is the "barber". Removal of this mouse may end the condition with hair coat returning to normal in those remaining but often another mouse will assume the role.

D. Dermatitis

Skin lesions can have several etiologies:
1) Mite infestation- typically occurs around the head, neck, shoulders and back and the lesions seen are self inflicted due to irritation caused by the insects. Diagnosis is by direct microscopic examination of the skin and hair shafts. Several treatments are available and handling mice from separate cages without changing gloves or disinfecting equipment can rapidly spread this infestation throughout the colony.

2) Bite wounds- as explained previously, fighting, especially among males of certain strains, is not rare. Typically wounds are seen on the rump and genital areas and along the tail. As with barbering, frequently one mouse is seen with no lesions. Removing him may alleviate the aggression but often a new hierarchy develops necessitating single housing of affected animals.

3) Ulcerative dermatitis- is a common condition seen in C57BL mice and as yet has an unknown etiology, but mite infestations promote the conditions. Affected mice have severe crusted lesions along the back and rump that frequently become infected with opportunistic bacteria.

MOUSE NORMAL VALUES

Weight , adult male	20-40 gm
Weight, adult female	25-40 gm
Birth wt.	1-1.5 gm
Breeding age, male	60d, 20-35gm
Breeding age, female	50-60d (can be much earlier), 20-30gm
Estrus cycle	polyestrus
Length of cycle	4-5 days
Gestation	19-21 days
Weaning age	21 days (varies with inbred strains)
Mating systems	pairs; 1 male x 3 females
Litter size	10-12 (smaller in most inbred strains)
Daily wate/food requirement	ad lib
Daily water consumption	~15ml/100gm/d
Daily food consumption	~15gm/100gm/d

Physiological values:

Heart rate, beats/min	470avg., 300-650
Respiratory rate, breaths/min	138 avg., 90-180
Body temp., C˚	37.5˚, 36.5-38.0
Blood pressure	113-147/81-106 mmHg
Whole blood volume	70-80ml/kg, 6-7% body wt.
Safe bleed (weekly)	7.7ml/kg

Blood sampling sites:

Retro-orbital sinus; Tail, central caudal artery; Cardiac puncture (terminal procedure only, anesthesia required)

Routes of injection:

Intramuscular (IM): biceps femoris, quadriceps Subcutaneous (SC): scruff at nape of neck
Intraperitoneal (IP): lower right quadrant of abdomen Intravenous (IV): lateral tail veins
Intradermal (ID): dermal layer of skin, usually dorsal trunk

Injection sites	Volume/site (adult)	Needle gauge
Intramuscular	0.05ml	<23g
Subcutaneous	2-3ml	<20g
Intraperitoneal	2-3ml	<21g
Intravenous	0.2ml	<25g
Intradermal	0.1ml	<21g

LABORATORY MOUSE - REPRODUCTIVE AND DEVELOPMENTAL DATA

WEIGHT AT BIRTH	1g
WEIGHT AT 20 DAYS	8 - 12g
WEIGHT OF ADULT	30 - 40g
AGE AT WEANING	18 - 21 days
FIRST ESTRUS	25 - 28 days
FULL SEXUAL MATURITY	7 - 9 weeks
ESTRUS CYCLE	4 - 5 days
DURATION OF SEXUAL RECEPTIVITY	12 hours
PSEUDOPREGNANCY	10 - 13 days
GESTATION	19 - 21 days
POST PARTUM OVULATION	12-18 hrs. after parturition
INTERBIRTH INTERVAL (POST PARTUM ESTRUS)	3.5 - 6 weeks

CHARACTERISTICS OF MICE 0-21 DAYS OLD

DAY	CHARACTERISTIC
0	BLOOD RED COLOR
1	LIGHTER RED, MILK APPEARS IN STOMACH (MILK SPOTS)
2	EARS STILL BACK, STILL LIGHT IN COLOR
3	EARS HALF WAY UP
4	EARS STRAIGHT BACK OFF HEAD
5	SKIN IS MUCH THICKER, MILK SPOTS DISAPPEARING
6	FUZZ STARTS
7	COMPLETE COAT OF FUZZ
8	LOWER INCISORS VISIBLE, NOT ERUPTED
9	INGUINAL NIPPLES VISIBLE IN FEMALE
10	LOWER INCISORS ERUPTED
11	UPPER INCISORS ERUPTED
14	EYES OPEN
3 WEEKS	OVAL PALPEBRAL OPENING, FINE SOFT FUR, TRIANGULAR SHAPE TO HEAD
4 WEEKS	ROUND PALPEBRAL OPENING, SMOOTH FUR, TRAPEZOIDAL SHAPE TO HEAD