## The effects of temperature, relative humidity, and nocturnal and diurnal ¥ feedings on feed intake, growth rate, and health in orphaned neonatal kittens UCDAVIS VETERINARY MEDICINE

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**Figure 1**: Orphaned neonatal kittens (*Felis catus*) at 1 week of age, littermates

## INTRODUCTION

- Solution Orphaned neonatal kitten mortality rate is estimated between 15-40%. Solution Neonatal kittens are poikilothermic until 4 weeks of age, but there are no standard temperature (TEMP) or relative humidity (RH) recommendations for their care.
- **%** RH must be adequate to prevent dehydration.
- Soler temperatures increase energy expenditure and oxygen consumption due to kitten's high surface to volume ratio
- Sustain The volume of food needed to sustain increased energy expenditure may increase the incidence of diarrhea in kittens further increasing dehydration and necessitating medical intervention.

## HYPOTHESIS AND SPECIFIC AIMS

<u>Hypothesis</u>

**§** Food intake will not vary between nocturnal and diurnal feedings, but TEMP and RH will affect growth rate.

**1** Incidences of diarrhea will affect growth rate.

Specific Aims

- Solution Determine what factors affect growth rate, feed intake, and diarrhea in orphaned neonatal kittens.
- Summer Explore if feed intake varies between day and night feeding schedules.

## **METHODS**

- S All kittens in the study were found by Good Samaritans and fostered through the Orphan Kitten Project (OKP) or other rescues and shelters.
- Kittens were housed in incubators starting under 7 days of age until 3-4 weeks of age with TEMP at 80° or 90° F and either 50% or 60% RH.
- Solution Food Conversion Ratio (FCR) was calculated based on food intake (g) / weight gain (g)
- Kittens were fed every 2-4 hours with increasing intervals as they aged.
- Solution Food intake (g) was recorded at each feeding and compared between daytime (6:30am-6:30pm) and nighttime (6:30pm-6:30am)
- S All occurrences of diarrhea were recorded.
- Linear mixed models assessed the effect of TEMP, RH, age when entering the study, proportion of days the kitten had diarrhea, starting weight, day:night feeding ratio (DN), the sex of the kitten, and survival status on FCR. Litter was included as a random effect. FCR data were log transformed to meet the assumptions of normality.

Temperature (F)	Humidity (%)	# Kitte
80	50	10
80	60	12
90	50	13
90	60	16









Figure 2: Food Conversion Ratio (FCR) is the ratio of grams food fed/grams weight gained. A lower FCR indicates more efficient conversion of food into weight gain. Many variables may interact to affect FCR. Decreased TEMP and RH increase energy expenditure and thereby increase food intake. Increased food intake may lead to diarrhea. Low birth weight has been a suggested indicator of increased mortality and moreover kittens with lower birth weights tend to consume less food and experience less weight gain thereby potentially spuriously decreasing FCR.



Figure 3: Rcom MX-BL600N Pet Incubator. Equipped with digital temperature and humidity sensors and controls with connections for oxygen tanks, ionizer, and antibiotic air filters. This is a litter of 1 week old kittens in the incubator.

## RESULTS

- Support The average day:night ratio for amount fed was 1.35 (sd = 0.41), suggesting that kittens were fed more food during daytime hours.
- S The model results suggested that survival status, proportion of days with diarrhea, and time in the incubator were related to the FCR when considering all kittens in the study.





- of weight gain caused by the diarrhea.
- be affected by being maintained at a higher TEMP.
- during the daytime hours.
- Solution Higher DN ratios of feeding were associated with increased FCRs.

## **FUTURE & CURRENT RESEARCH**

- neonates to assess long-term effects of being orphaned.
- littermates

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*Physiology* 1965; 177: 192-202.



### DISCUSSION

Solution Increased incidences of diarrhea were correlated with higher FCRs, but it is unknown if the increased food intake caused the diarrhea or if the FCR increased due to a lack

Solutions A Section 20° F had lower FCR ratios suggesting that food intake and growth rate may

Solution Kittens may grow best when fed around the clock, instead of when being fed more

Solution Kittens with higher FCRs had a higher mortality rate, but kittens who did not survive did not have significantly higher DN ratios compared to kittens that did survive.

Support Increased time in the incubator correlated with lower FCRs suggesting kittens became more efficient at converting food into weight gain with age.

Solution To optimize weight gain and survival and minimize diarrhea the data suggests that neonatal kittens may do best when housed at 90° F and either 50% or 60% RH.

S Telomere length at birth and at neuter/spay will be compared to non-orphaned

Subscription Concurrent research analyzed the effects of TEMP on physical contact among

Subsequent kitten litters will be kept outside incubators as a point of comparison.

## ACKNOWLEDGEMENTS









**#ThanksToMaddie** 

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