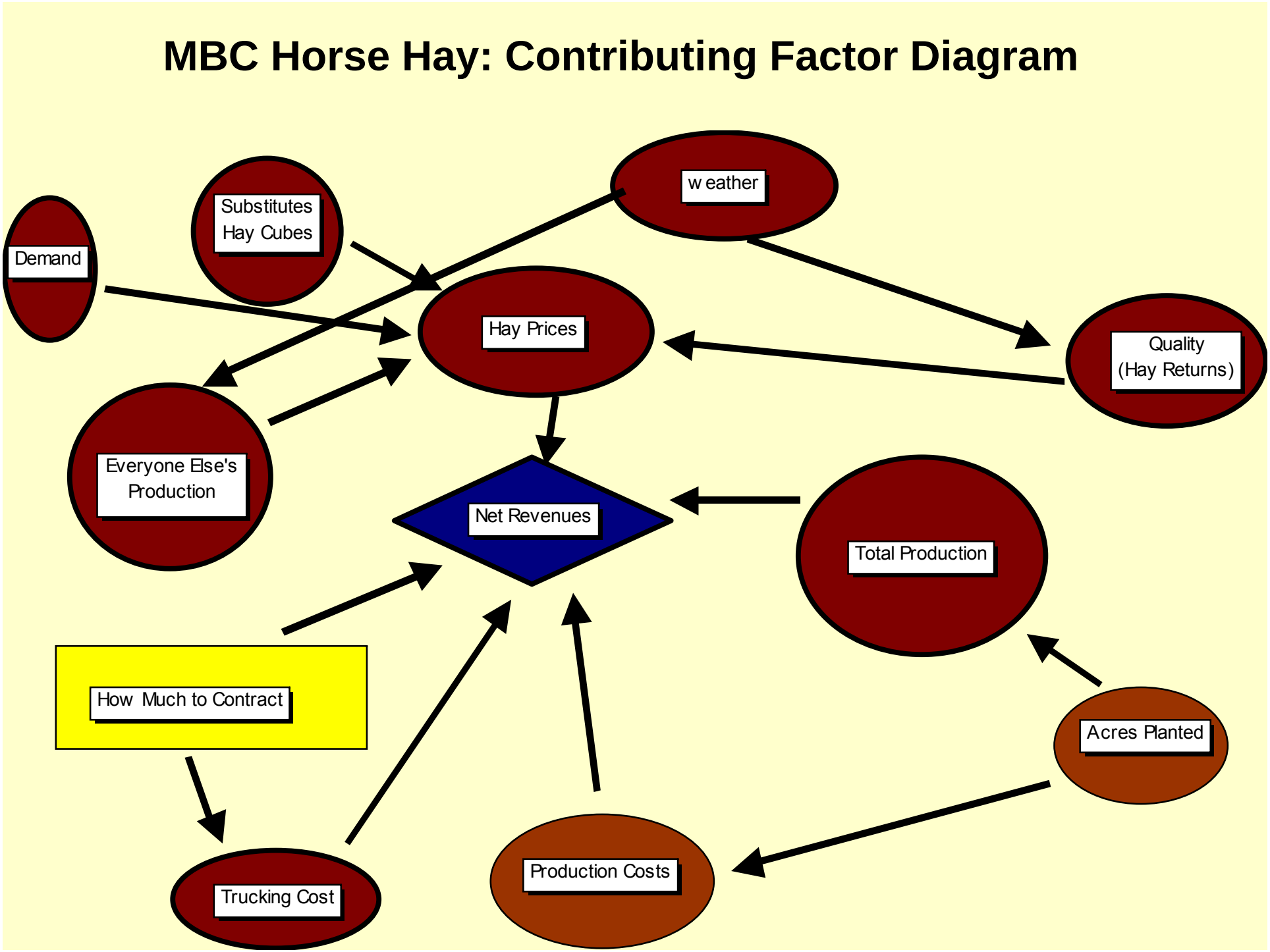
Scenario & Sensitivity Analysis

AEC 851 – Agribusiness Operations Management

Spring, 2006

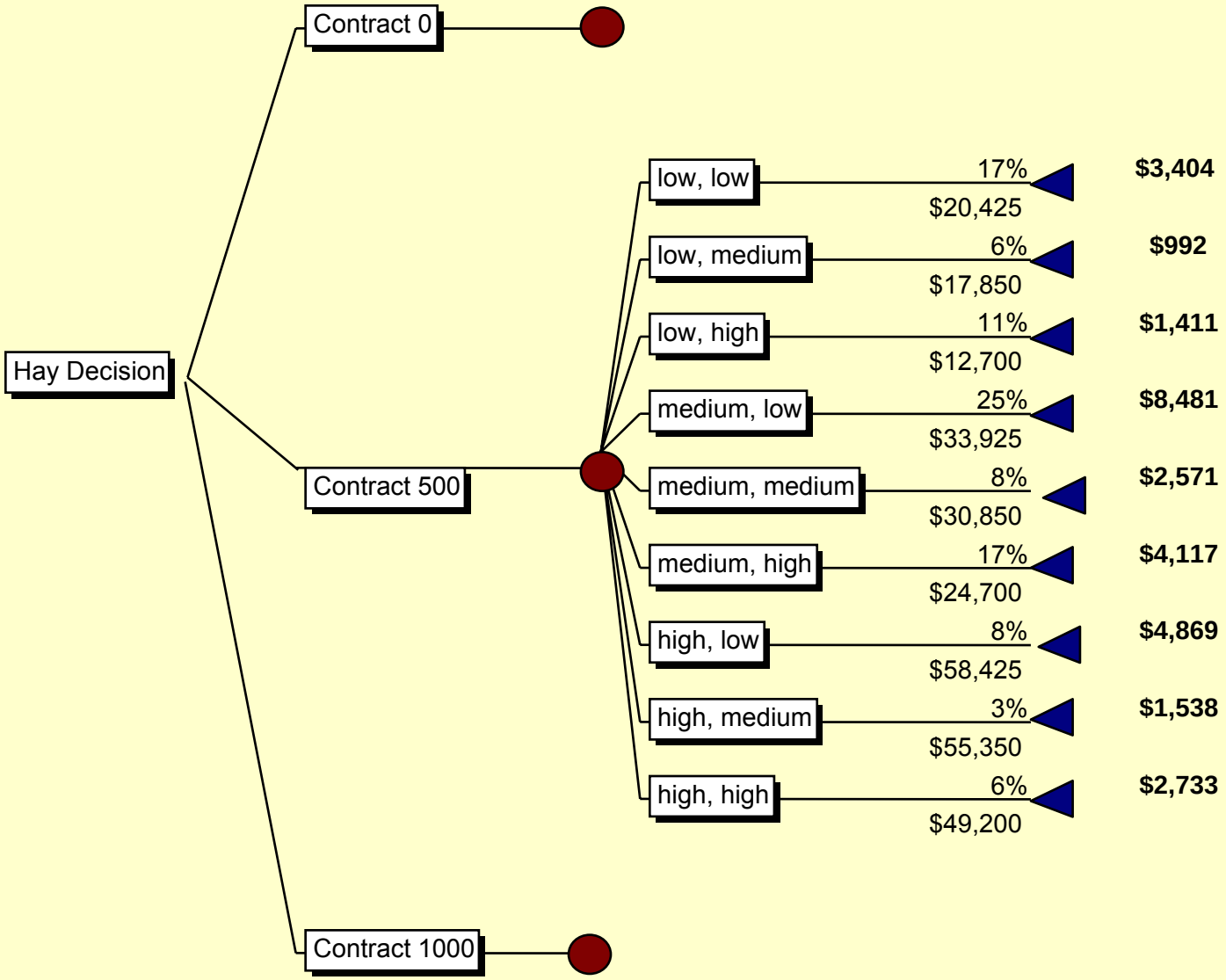
MBC Horse Hay: Contributing Factor Diagram



Scenario analysis & Decision trees

- Identify decision alternatives (A_i)
- Evaluate possible states of nature (S_j)
- Estimate possible payoffs (m_{ij}) to each alternative under each state of nature
- Estimate probabilities of each state ($Pr[S_j]$)
- Calculate
  - Payoff matrix
  - Regrets matrix
  - Risk-weighted payoff matrix

Hay Contract Decision Tree (500 ton contract)



Decision Rules w/o Probabilities

- Payoffs basis (direct gains)
  - Minimax (best if worst case occurs)
  - Maximax (best if best case occurs)
- Regret basis (opportunity costs)
  - Minimax Regret (least bad of wrong decisions)

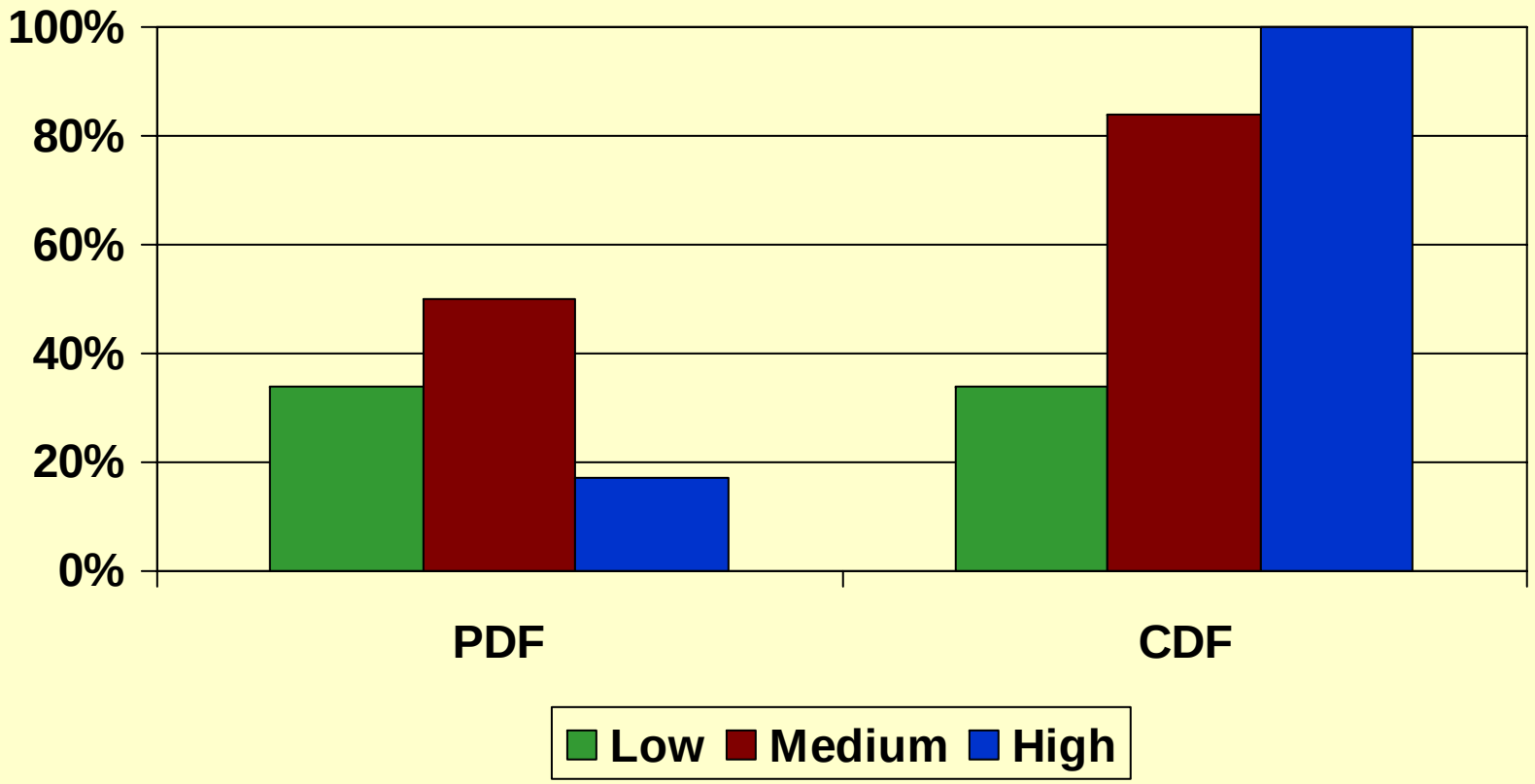
Decision Rules w/ Probabilities I

- Simplest rules
  - Max expected value
  - Max in most likely state
  - Min variance
- Safety-first
  - Min Pr(m) ≤ cut-off
    - E.g.: Minimize probability of payoff ≤ $25,000

Decision Rules w/ Probabilities II

- Risk efficiency: Comparing distributions
  - Does one strategy out-perform other in all states of nature?
    - ➔ First-degree stochastic dominance (FSD)
  - Does one have higher mean / lower var.?
    - ➔ Mean-variance (E-V) efficiency
- "Expected Utility" – Weighting expected returns by variance
    - ➔ EU = E(A) - δVar(A)

Hay price probabilities: Individual (PDF) – Cumulative (CDF)



Joint Probabilities

(Horse Hay case)

	Low price	Med price	High price	RETURN STATES:
Low return	.17	.25	.08	.50
Med return	.06	.08	.03	.17
High return	.11	.17	.06	.34
PRICE STATES:	.34	.50	.17	